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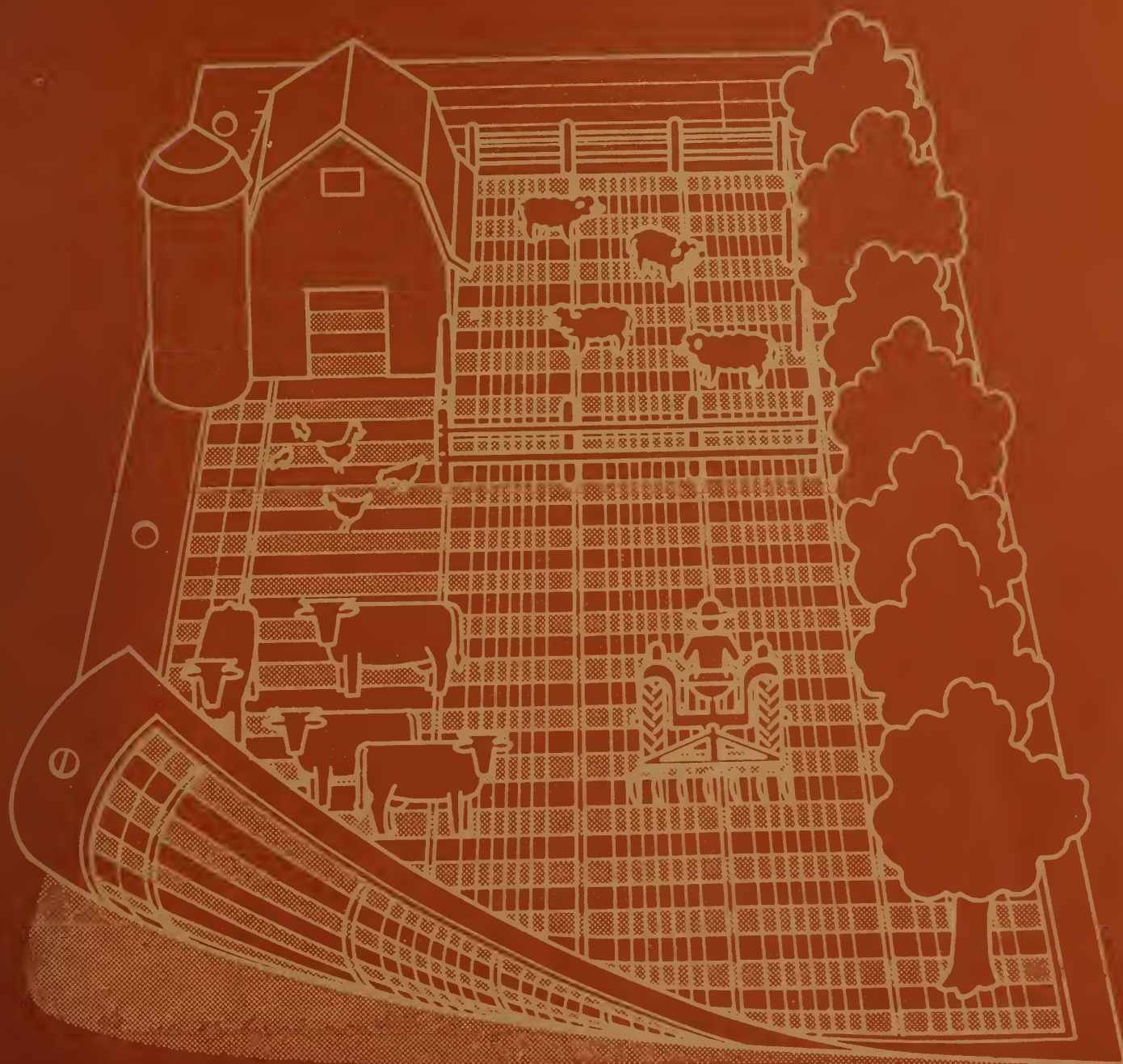
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# Economic Indicators of the Farm Sector

## Farm Sector Review, 1983



ABSTRACT

Income from all farm and nonfarm sources totaled \$24,090 per farm in 1983, down from \$25,731 in 1982. The payment-in-kind program and acreage control programs substantially reduced input use and production expenses. However, farmers suffered the effects of large world agricultural supplies, weak demand, declining exports, and drought. Farmers grossed 4 percent less than the year before on sales of farm goods. Crop receipts fell nearly 7 percent. Livestock earnings fell 1 percent.

Keywords: Net farm income, costs of production, capital flows, balance sheet, cash flow, savings, output, productivity.

NOTE

Many 1983 farm economic series are preliminary. The 1983 empirical data are either preliminary or were unavailable at publishing time.

SALES INFORMATION

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## PREFACE

This is one of five reports in the Economic Indicators of the Farm Sector series. Other reports are Income and Balance Sheet Statistics, State Income and Balance Sheet Statistics, Production and Efficiency Statistics, and Costs of Production. The Farm Sector Review examines economic developments in the farm sector and contains farm income research articles emphasizing farm sector data estimating methods.

Many of the USDA economic accounts are also used by the U.S. Department of Commerce to estimate the State and regional personal income series, the national income and product accounts, and the national input-output table.

This report was prepared by the Economic Indicators Research and Forecasts Section, Economic Indicators and Statistics Branch, National Economics Division, Economic Research Service. Principal contributors to this report are:

Coordinator--James Johnson	(202) 447-2317
Economics editors--Richard Simunek, Sara Short	447-8342
Managing editor--Jim Carlin	447-7305
Farm income analysis and forecasts--Gary Lucier	447-2317
Type of farm income--Agapi Somwaru	447-2317
Cash receipts--Roger Strickland	447-4190
Ken Lee	447-4190
Assets and debts--Linda Farmer	447-8342
Production expenses--Sandra Suddendorf	447-4190
Annette Clauson	447-4190
Off-farm income--Mary Ahearn	447-4190
Productivity--Charles Cobb	447-3055
Costs of production--Ken Baum	447-4190
Bob McElroy	447-2317
Richard Prescott	447-4190
National input and output--Gerald Schluter	447-7383
Data processing support--Helen Devlin, Janusz Kubica	
Secretarial support--Sandra K. Gurick	

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## HIGHLIGHTS

Economic conditions in the farm sector were both volatile and diverse in 1983. Farm sector performance was mixed because of the combined effects of large global agricultural supplies, weak demand and declining exports, and drought. However, the farm sector benefited from lower interest rates, moderating inflation, lower production expenses, higher crop prices, and Government programs. This report uses current estimates of 1983 farm economic data to describe last year's developments in the farm sector.

Farm income likely varied more widely than normal in 1983 depending on commodity produced, region, farm size, debt structure, and off-farm income opportunities. The drought in 1983 created wide differences in the incomes of individual farmers. In drought areas, farmers who chose not to participate in the commodity programs or not to buy insurance were particularly hard hit. Thus, although the cash incomes of farmers improved largely because of decreased expenses and sales from inventories, the receipts of many farmers in drought areas probably did not cover cash expenses, leaving many farm families in a difficult financial situation.

Net cash income (including net CCC loans) available to farmers in 1983 reached an estimated \$40.1 billion, up \$2.4 billion from the 1980 record. Total net farm income in 1983 was estimated at \$16.1 billion, down from the \$22.3 billion of 1982.

U.S. farm families on average earned \$24,090, down from \$25,731 in 1982, from farm product sales and other farm sources and off-farm income. Farmers who sold less than \$20,000 in farm products earned 70 percent of the total off-farm income.

Farmers received about 4 percent less than the year before on sales of farm goods; crop receipts fell nearly 7 percent. Livestock earnings fell 1 percent. Weak demand for farm products and a strong dollar abroad tempered U.S. farm product sales. A reduced sales volume more than offset a 2-percent increase in overall prices. Crop prices averaged about 5 percent more, but livestock and livestock product prices declined nearly 3 percent. Federal payments of about \$9.3 billion to farmers bolstered 1983 farm income. Government acreage-reduction programs prompted farmers to plant 14 percent fewer acres than the year before.

Reduced planted acreage and drought compelled farmers to cut back 4 to 5 percent on inputs used, such as fertilizers, custom harvesting, fuel, and operating loans. The total expenses of farm production fell around 3 percent, only the third decline since 1940 (expenses also decreased in 1949 and 1953).

Farm equity excluding farm households totaled about \$733 billion on January 1, 1984, a nominal decrease of about 1 percent, after declining the past 2 years. In real terms, however, the farm sector's equity fell slightly, for the fourth straight year.

The value of farm real estate assets fell about 1 percent to an estimated \$704 billion by January 1, 1984, the third straight year of decline. The debt-asset ratio remained steady because of a decline in total liabilities and the drop in farm asset values.



# Economic Indicators of the Farm Sector

## Farm Sector Review, 1983

### INTRODUCTION

Aggregate economic indicators of the farm sector suggest that 1983 was about the same financially for farmers as 1982. Cash incomes of crop farmers improved but were unevenly distributed while cash incomes of livestock farmers remained about the same as 1982. Deterioration in the farm balance sheet continued but was not as severe as in the previous two years. Several financial ratios, widely used to indicate relative financial stress, remained steady or improved marginally in 1983. But, although aggregate net cash income increased, net farm income declined substantially because of the rapid drawdown of farm grain inventories.

The distribution of income became even more unbalanced because of the severity of the drought and the decisions made by farmers on farm program participation. Farmers hit severely by drought and not participating in Government programs or not being covered by crop insurance likely fared poorly. Farm operators who were highly leveraged (heavily in debt), also likely faced increased financial stress. But, those farmers who were not affected by drought or who participated fully in the payment-in-kind (PIK) program may have had one of their better net cash income years and may have been able to reduce debt, if they were able to take advantage of the stronger crop prices.

This report examines economic developments in the farm sector and contains farm income research articles emphasizing farm sector data estimating methods.

### FARM SECTOR OVERVIEW

Producers continually face production, marketing, and financial management decisions affecting the success or failure of their farm business. When interest rates were low and stable, determining safe levels of debt that could be supported by farm income meant considering expected yield and commodity price variations. Increased linkage with international markets has contributed to greater volatility in commodity prices and has made farmers' returns more uncertain. Developments in national financial markets have also caused interest rates to fluctuate greatly, adding to farmer uncertainty.



The amount of cash required to operate the farm or ranch business has grown immensely because of the existence of larger farms, the substitution of capital assets for farm labor and other inputs, and inflation. On a per-farm basis, total assets and debts have quadrupled in the past decade. Meanwhile, operating inputs purchased from nonfarm sources have risen nearly 20 percent in real terms, accounting for more than half of the inputs used in agriculture. As a result, borrowing supplies a larger percentage of the cash required for the purchase of real estate, machinery, other investments, and operating inputs. Rising interest rates and lower inflation rates have contributed to cash flow and balance sheet difficulties for many farmers, because the return to capital has been less than the interest rates being paid by indebted farmers.

The relative incidence of financial stress depends on the amount of debt owed, the amount of old-versus-new debt, types of commodities produced, and Government program participation.

The interpretation of changes in the economic well-being of the farm sector must simultaneously consider: (1) enterprise costs and returns which reveal changes in inputs, yields, and prices; (2) cash flow positions of farms and of the sector which provide information about the cash requirements of farm businesses; (3) net income which provides information about the profitability of businesses for a particular period of time; and (4) net worth which shows what is owned versus what is borrowed.

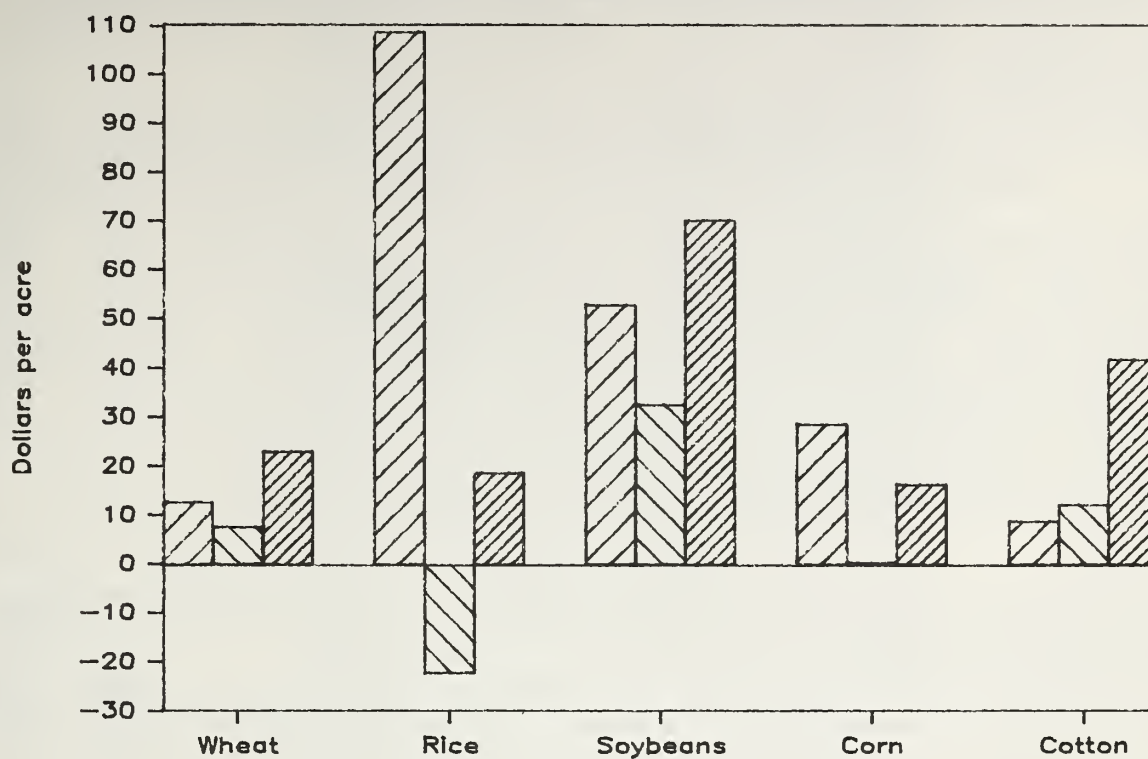
A Farm  
(Enterprise)  
Perspective of  
Costs and  
Returns

Costs and returns at the crop and livestock enterprise level, which provide an initial perspective of well-being of U.S. agriculture, are valuable in analyzing changes in the financial position of farms that represent, of course, a collection of enterprises. Net cash receipts are a widely used indicator of farm enterprise profitability and are defined here as the cash left over to pay principal on debt, family living expenses, a return to management, and a return to durable inputs such as machinery and land. From 1981 to 1983, net cash receipts varied widely by crop and livestock enterprise (fig. 1).

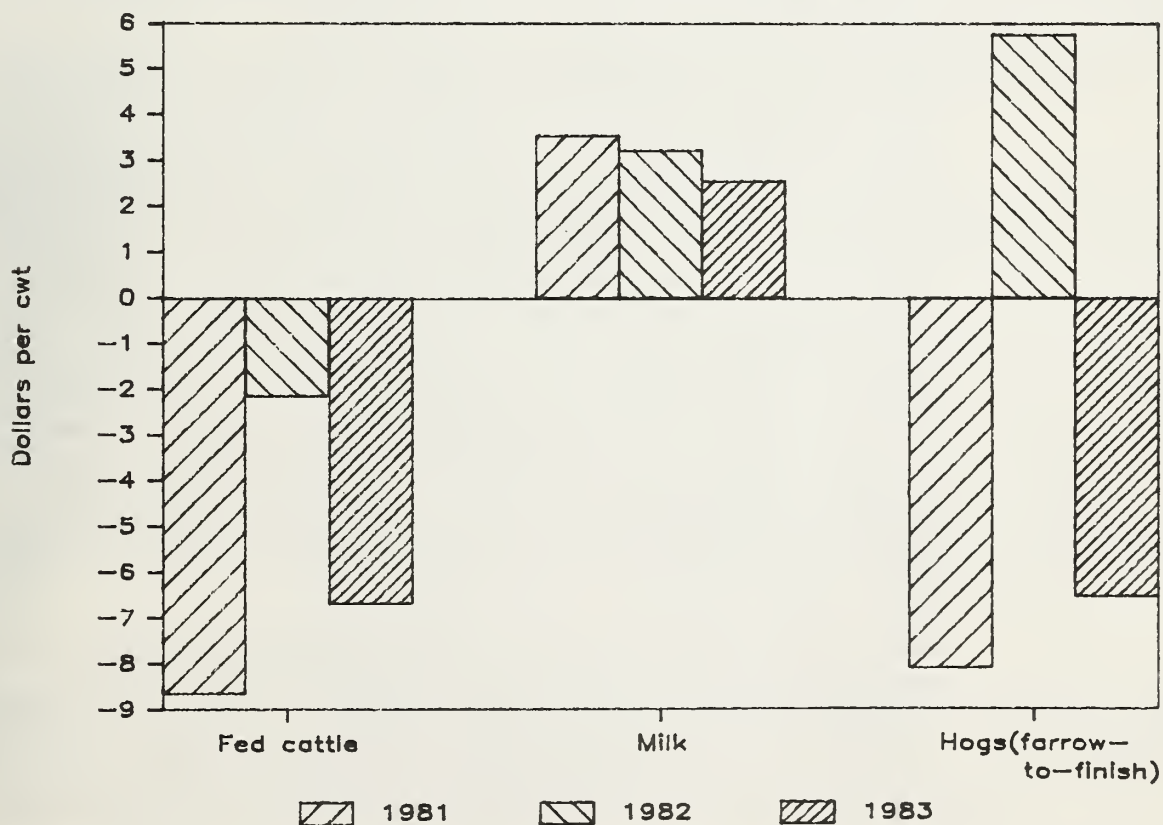
For the cash grains, soybeans, and cotton, net cash receipts per acre generally fell for 1981 and 1982, and then were estimated to have strengthened in 1983. During this same period, expenses (including variable expenses, fixed expenses, and capital replacement costs) rose but with a slightly larger increase from 1980 to 1981. This rise in expense, coupled with the decrease in receipts because of lower U.S. and world prices, caused a substantial decline in net cash receipts per acre for the aforementioned crops. The price of feed grains in 1982 fell, however, so feed cost expenses for livestock enterprises also fell, resulting in continued or increased profit margins for fed cattle, milk, and farrow-to-finish hog operations. When crop prices strengthened in 1983, these estimated margins fell to marginal or negative

Figure 1

# NET CASH RETURNS PER ACRE, 1981-83



# NET CASH RETURNS PER CWT, 1981-83



levels, particularly for fed cattle and hogs. However, cow-calf operations became less profitable with increasingly negative margins during this same period because of lower prices.

Farmers who planted sorghum and barley, and hard red spring wheat were not able to cover cash costs of production. In the Southeast, cotton net receipts per acre during 1983 (before Government payments) were substantially negative and indicated continuing financial difficulty for specialized farms. Hard red winter wheat, grown west of the Mississippi River, showed marginal or negative net receipts until 1983. However, soft red winter wheat grown in the eastern States showed positive net receipts in 1980 and 1981 before turning negative in 1982. Estimated net receipts for this crop were only slightly more favorable in 1983 when prices firmed. The net receipts for the average national acre of peanuts and soybeans have shown a relatively high level of profitability compared with all other crop and livestock enterprises. These net receipt data do not include any expenses relating to rental of peanut allotments. Rice showed large returns in 1980 and 1981 before turning negative in 1982 but recovered slightly in 1983.

The cost and return estimates discussed earlier do not consider the additional cash flow created by commodity program participation, which was at a very high rate in 1983. For participants, price deficiency payments would have added about \$21.65 per acre in cash flow for wheat, \$5.94 for oats, \$10.29 for barley, \$70.18 for cotton, and \$135.34 for rice, greatly improving the overall farm returns for producers of these crops.

A general understanding of cropping patterns and enterprise cost and return estimates can provide insight into changes in the economic well-being of farms in different areas of the country. For example, corn is grown in combination with many crops. In the eastern Corn Belt, corn is grown primarily with soybean, and soft red wheat, and in the Plains and western Corn Belt with soybeans, grain sorghum, barley, and wheat. In 1983 both corn and soybean estimated net cash receipts per acre were larger than 1982. Consequently, producers of these two principal crops should have ended 1983 in a stronger cash position. Meanwhile, net receipts for hogs, mostly produced in the Midwest, dropped considerably from their 1982 level. Sorghum and barley net cash receipts per acre also improved slightly from 1982 to 1983, but also remained negative in 1983, suggesting that farms with these crops in the Plains and northern and western Corn Belt States continued to have cash flow problems.

Wheat is grown nationwide. Farms depending on wheat for a primary share of receipts are basically located in the southern and northern Plains and Pacific Northwest. Southern Plains producers primarily grow cotton and sorghum in addition to wheat. The estimated returns for each of these crops improved in 1983, but the sorghum crop still failed to cover



all cash expenses, to provide for capital replacement, and to pay all labor an average cash wage. The cash provided through farm program deficiency payments would have improved any earnings statement. In the northern Plains and Pacific Northwest, barley and corn are the primary crops grown with wheat. Estimated returns for corn and wheat were substantially better in 1983 than in 1982, indicating that the cash position of farmers with these crops should have improved.

Cotton and rice are produced primarily in the Delta States, Texas, Arizona (cotton only), and California. Cotton net receipts were negative in 1981 and 1982 while earnings from rice production turned negative in 1982. Both cotton and rice earnings improved in 1983, with rice earnings remaining negative, however. Deficiency payments would have been important in maintaining earnings for cotton and rice producers. Cotton farmers received more than \$1.2 billion during the last 2 years, and rice producers received around \$400 million.

Aggregate and  
Industry Per-  
spectives of  
Farm Income  
and Expenses

The income or profit and loss statement for a farm, or for the farm sector, is explicitly designed to link earnings and expenses (both cash and noncash adjustments) associated with the production and sale of agricultural commodities. The income statement measures profitability over a specific period of time, here a calendar year. Measures of farm income reflect two perspectives. First, an estimate of before tax net cash income is developed to show how much cash farmers elected to receive in 1983 versus their cash outlays. Net cash income measures the difference between the flow of cash in and out of the sector. Second, net farm income is then calculated to determine how much farmers earned from production of farm commodities in 1983 after noncash adjustments, such as depreciation or value of inventory changes.

Aggregate  
Income Per-  
spective

A combination of factors reduced the level of net cash income when the 1980's began. <sup>1/</sup> Some of these were: (1) a worldwide economic recession which contributed to reduced export volume and lower demand for farm commodities; (2) high real interest rates; and (3) consecutive record levels of crop production during 1981 and 1982 which resulted in a substantially increased supply and, together with the change in demand, lower commodity prices. In 1981 and 1982, real net cash incomes fell when small gains in cash receipts were offset by relatively larger increases in production expenses. Although the increase in expenses slowed during 1982 because of reduced price increases in the economy, low crop and livestock prices kept the volume-induced increase in cash receipts small. Government payments and Commodity Credit Corporation (CCC) loans helped support incomes during 1982.

During 1983 the PIK program improved the farm sector's income and cash flow. Reduced expenses and increased Government payments combined to raise net cash income to a nominal

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<sup>1/</sup> Net cash income excluding net CCC loans.

record high of \$40.1 billion. Even after accounting for inflation, net cash income was almost \$1 billion greater than the 1982 level. But, net farm income after inventory adjustment fell to \$16.1 billion in 1983, down from \$22.3 billion in 1982. A record negative inventory change of \$11.7 billion, caused by stronger crop prices and an unprecedented 26-percent drop in crop production, prompted most of the decline. Estimated crop cash receipts declined in 1983 from \$74.6 billion in 1982 because reduced marketings offset higher prices received.

Livestock producers experienced higher feed prices (up 10 percent) because of smaller feed supplies as well as a 3-percent decline in livestock prices from the record large volume of livestock output during 1983. Broiler producer cash receipts did increase, however, on the strength of higher prices. Overall, livestock cash receipts dropped nearly \$1 billion from the \$70.1 billion of 1982.

Production expenses declined 3 percent in 1983 to \$135.3 billion because of smaller acreage and the largest decline in input use since 1934. Prices paid by farmers reflected the moderating inflation rate in the general economy and rose about 3 percent when higher prices for feed and machinery offset lower prices for fertilizer, fuels, and feeder livestock. Expenses for manufactured inputs declined 9 percent largely because of reduced use. Interest expenses fell 4 percent because of lower average interest rates on outstanding debt.

Industry  
Perspective

Because of substantial differences in the types of inputs used and products produced and sold, changes in estimated net farm income and net cash income are estimated to have differed widely among crop and livestock farmers (fig. 2). The net cash income of all crop farms is estimated to have increased by 16 percent in 1983 compared with a 4-percent decrease for all livestock farms.

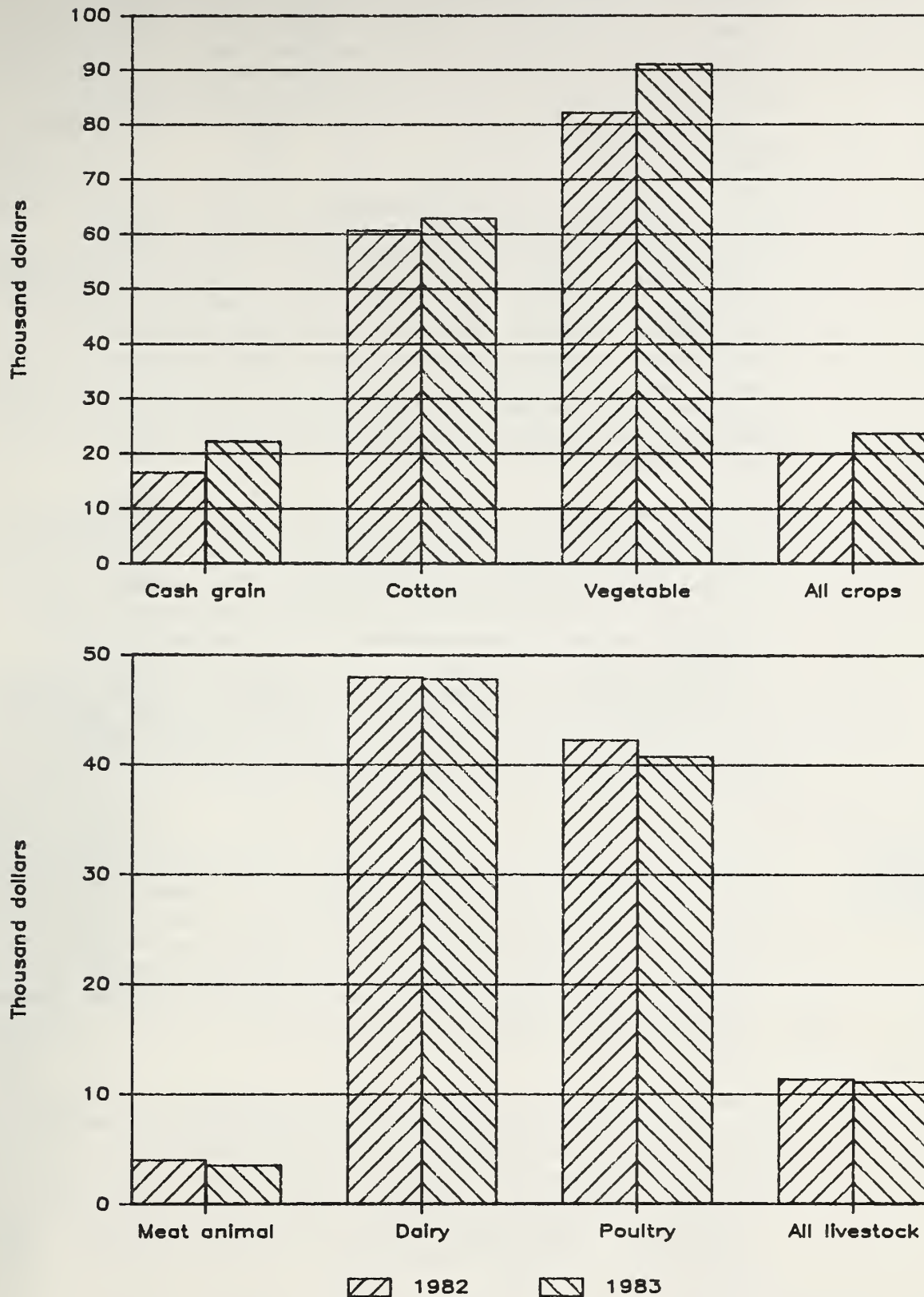
Among crop farms, changes in cash income during 1983 depended greatly on the primary commodities produced. Boosted by the double effect of commodity programs, which increased grain prices and direct Government payments and contributed to reduced production expenses, income per cash grain farm increased an estimated 34 percent from 1982 to 1983. Fertilizer, fuel and energy, interest paid, and labor accounted for about 52 percent of the total cash expenses of cash grain producers in 1983. These expenses declined about 7 percent in 1983.

Net cash income per cotton farm is estimated to have increased only 4 percent, much lower in comparison to cash grain farms. Cotton cash receipts, excluding payments in-kind, likely dropped about \$18,000 per farm. In contrast to cash grain farm operators who earn about 60 percent of their income from farm sources, cotton farm operators earn about 80 percent of total income from farm sources, which makes total earnings of cotton more dependent on prices or production changes.



Figure 2

# NET CASH INCOME PER FARM, 1982-83



Estimated net income on tobacco farms likely dropped 22 percent in 1983. A 5-percent decrease in tobacco prices reinforced a 28-percent drop in production caused by the drought. In contrast to cotton and cash grain farms, only about a fourth of tobacco farm operator incomes are from farm sources. But, even with the heavy dependence on off-farm earnings, the large fall in income from farm sources is estimated to have resulted in an 8-percent decline in total operator income.

Estimated cash income per vegetable and melon farm of \$91,088 was the highest of any crop or livestock farm in 1983. Considering off-farm income, operators of these farms are estimated to have total per-farm income in excess of \$100,000. Cash income per fruit and tree nut farm likely dropped about 15 percent. However, on average, off-farm income of fruit and tree nut farmers equaled \$28,984, ranking second only to animal specialty farms, and total income from farm and off-farm sources likely reached about \$50,402. Total income from farm and off-farm sources of horticultural farmers in 1983 likely reached about \$88,394, an 18-percent gain over 1982.

Dairy farms have the highest average level of cash income among livestock farms, almost \$48,000 per farm. Dairy farm cash income in 1983 is estimated about equal to 1982 levels. Estimated net income decreased because of an increase in expenses due to milk marketing deductions and higher feed expenses. Dairy farm operators are also dependent on farm earnings for over 90 percent of total farm income. Cash income per poultry and egg farm was estimated to have decreased about 4 percent in 1983. While the estimated cash income of cattle, hog, and sheep producers likely decreased about 12 percent in 1983, total operator income, including off-farm earnings, remained about the same as 1982.

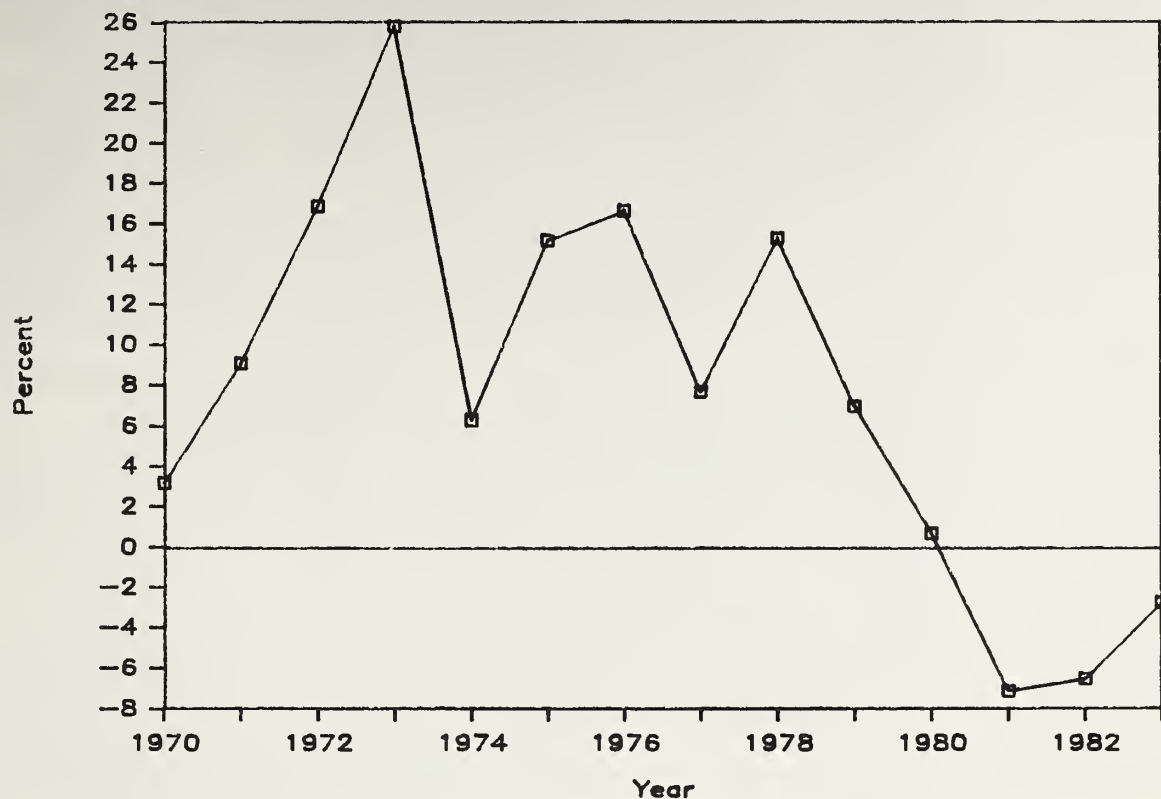
The Farming  
Balance Sheet  
and Rates of  
Return

Changes in income affect rates of return and farmers' net worth both directly and indirectly. The national net worth statement gives a perspective on financial conditions of agriculture at a given time and indirectly measures resource growth in the agricultural industry through year-to-year changes in net worth. Measures of financial liquidity and financial stress can be determined from the net worth statement by examining the amount of debt supported by various types of assets (fig. 3).

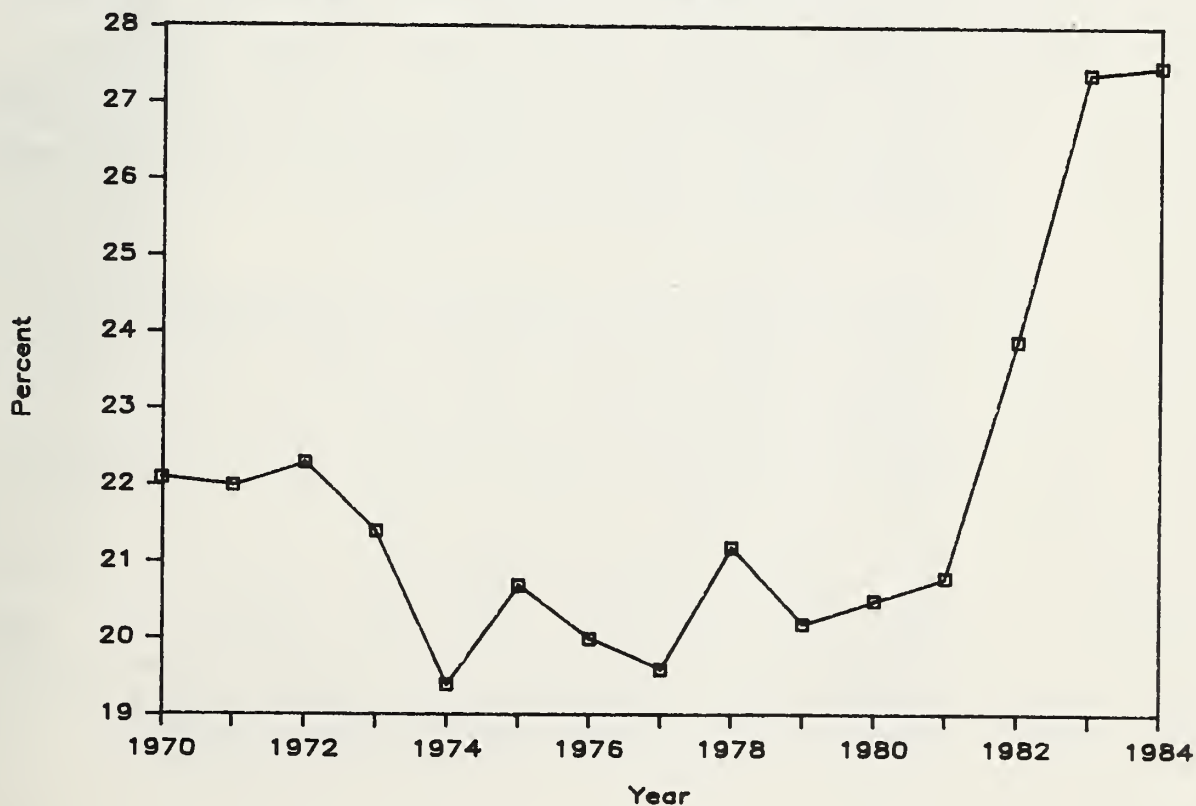
Farm sector assets, excluding farm households, are estimated to have decreased about 1 percent from January 1, 1983, to \$934.4 billion on January 1, 1984. This small decrease continued the nominal decline in asset values between 1981 and 1983, although at a slower rate. Because real estate constitutes about 75 percent of total assets, changes in the value of farmland dominate all other changes in the balance sheet assets.

Figure 3

## TOTAL RETURN TO EQUITY, 1970-83



## DEBT-TO-EQUITY RATIO, JANUARY 1, 1970-84





Total farm debt is expected to have declined 0.7 percent to \$201.3 billion by January 1, 1984, largely because CCC loans fell 32.5 percent when crop prices rose. In 1983 the high cost of borrowing, relatively lower farm income, and declining farmland values held real estate debt to only a 2-percent increase. This growth rate in real estate debt has declined from the 3.8-percent increase in 1982 and is considerably lower than in the decade from 1972 to 1981. Nonreal estate debt, excluding CCC loans, increased 1.6 percent from January 1, 1983, to January 1, 1984. Demand for nonreal estate loans was slack because of reduced input use, high interest rates, and the apparent desire of many farmers to reduce outstanding short- and long-term debt with larger than normal cash incomes.

Farm equity is estimated to have decreased almost 1 percent during 1983 to \$733.1 billion and is \$83 billion less than the peak equity value in 1981. Because the change in equity value failed to keep pace with the January-to-December 4.1-percent increase in the Consumer Price Index (CPI), the real wealth of the sector declined for the fourth consecutive year. The small nominal capital loss of \$5.5 billion on farm assets estimated for 1983 is considerably less than the nominal capital losses incurred in 1982 of \$34.4 billion. Real capital gains, the nominal physical asset gain adjusted for inflation plus the changes in the real values on currency, demand deposits, and farm debt, are expected to have declined about \$9 billion. Thus real capital gains, as a percentage of equity value, are expected to have fallen about 1 percent for 1983.

During the late 1970's and early 1980's, farmers looked to real capital gains for a significant portion of their total returns to farming, although most of these gains went unrealized. During the early 1980's, farmers' borrowing capacity diminished as the result of the declines in farmland values, high real interest rates, and low real farm income. As their equity eroded, borrowing capacity declined for many farmers forcing them to rely even more heavily on returns from current production to pay expenses.

Although ample funds are available to creditworthy borrowers, falling farmland values have made it more difficult for highly leveraged farmers to obtain loans. According to an American Bankers' midyear survey, the delinquency rate at agricultural banks between June 1982 and June 1983 was 3.7 percent, about the same as the previous year. Nationwide, fewer farmers had their financing discontinued by bankers in 1983 than in 1982, 2.9 percent compared with 3.3 percent.

During 1983 the estimated debt-to-equity ratio of the farm sector remained about the same at 27.5 percent, and well above 1979 to 1981 levels. This ratio, sometimes called the leverage ratio, is a measure of the solvency of the sector and slows the long-term financial structure of agriculture. The likelihood that farm operators are facing cash flow problems increases as the leverage ratio increases due to the

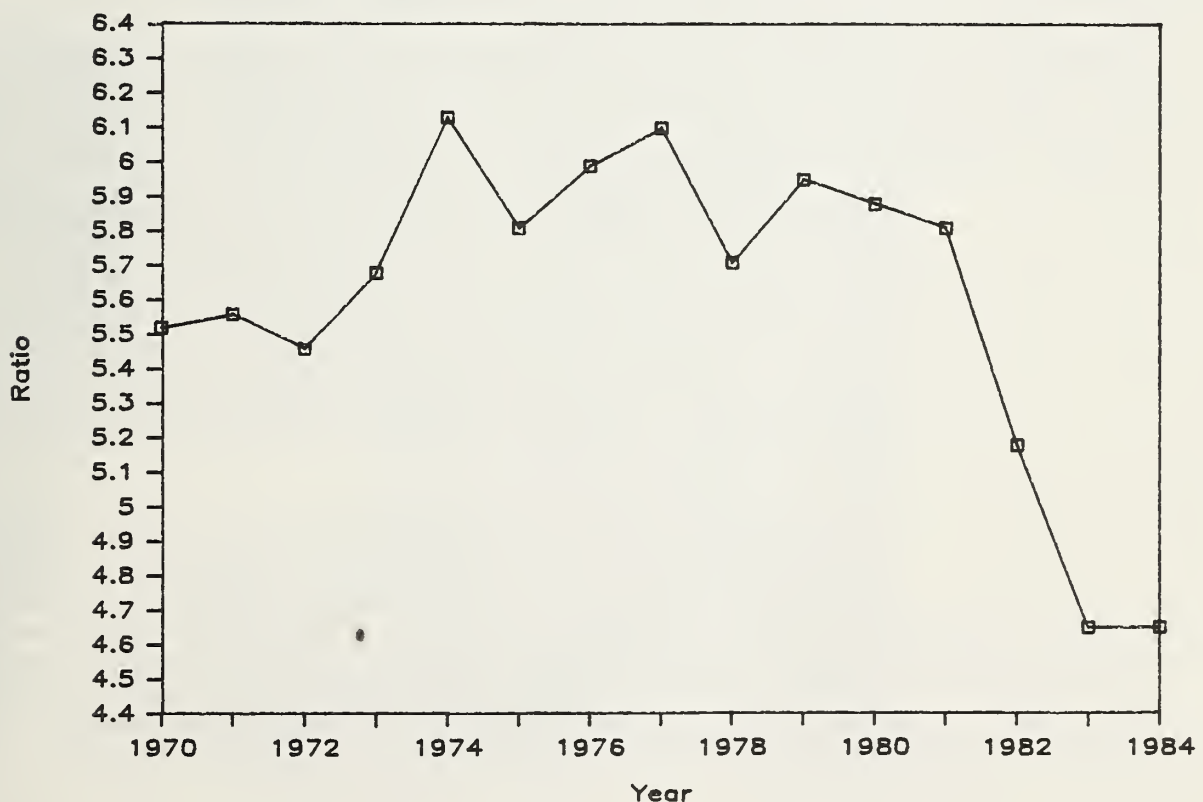
high level of interest rates in relation to rates of return to farm assets. From another perspective, the farm sector's equity dropped from an estimated 83 percent on January 1, 1980, to 81 percent in 1982 before dropping even further to 78.5 percent on January 1, 1984. This further drop during 1983 resulted largely from the further erosion in real estate values.

The net capital ratio, also a measure of solvency, shows the debt relative to the value of assets and indicates the ability of the farm sector to repay all its debts. In 1979 the farm sector had \$5.87 of assets for each dollar of debt. By January 1, 1983, because of a rising debt load and falling asset values, only \$4.65 of assets per dollar of debt were available, a decline of almost 21 percent. Even so, the 4.6 net capital ratio reflected a generally tightened but still relatively healthy asset-to-debt situation in agriculture. During 1983 the net capital ratio remained steady at 4.6, indicating the same generally steady position demonstrated by the other summary financial ratios (fig. 4).

Finally, profitability measures for 1983 also remained weak. First, the total return to equity that measures the combined returns from income and real capital gain increased from a minus 6.5 percent during 1982 to an estimated minus 0.4 percent during 1983. The return to equity from residual current

Figure 4

## NET CAPITAL RATIO, JANUARY 1, 1970-84





income was 0.8 percent. The return from real capital gains that has been decreasing since 1980 remained negative but at a much lower level than during 1981 or 1982.

FARM SECTOR  
WELL-BEING AND  
ECONOMIC  
INDICATORS OF  
1983

At the outset of 1983, the outlook for U.S. agriculture was mixed. Declining interest rates and moderating inflation slowed the rising rate of farm production expenses. Between March 1981 and December 1982, the inflation rate dropped from 13.5 percent to about 6 percent. The prime interest rate of 20 percent or more in 1980 declined to 11 percent. In 1982 farm production expenses rose only about 2 percent over 1981 compared with an almost 10-percent increase in 1980. However, large global supplies of farm products and the continued worldwide recession triggered lower prices and weak domestic and foreign demand for U.S. agricultural goods. The strengthening dollar in international monetary markets also undermined the competitive appeal of U.S. products. The cost in local currencies of U.S. products increased at a time when foreign supplies were generally large, further weakening foreign demand.

A larger U.S. crop and excellent weather worldwide pushed world grain production to nearly 1.5 billion tons in 1981, a rise from below-normal world grain harvests in 1979 and 1980. In 1982 widespread good weather again pushed world grain production past the 1.5-billion-ton mark. U.S. grain output topped its 1981 record. Grain production increased in a number of importing countries, especially the Soviet Union and China. Weather in 1982 also contributed to a sharp jump in world production of oilseeds, another large sugar crop, and large cotton crops in foreign countries.

Although U.S. and world crop production set new records in 1981 and 1982, global demand for agricultural products shifted from a high-growth path to one of little or no growth. The world economic problems of the early 1980's depressed consumption of agricultural products. For example, during the 1960's and 1970's, global coarse grain consumption rose an average 16 million tons per year when diets switched to more animal-product foods. But, since 1979-80, growth in meat production has stopped, and coarse grain consumption has nearly leveled off. World wheat consumption, which increased by over 10 million tons, annually, during the previous two decades, has increased by a total of only 10 million tons since 1979-80. Cotton consumption averaged about 66 million bales from 1979 to 1981.

Deteriorating economic conditions during the early eighties depressed consumption of agricultural commodities. Rising production caused stocks to accumulate steadily, particularly in the United States. In early 1983, analysts predicted that by the end of the 1982-83 marketing year world grain stocks would have likely reached about 260 million tons (60 percent of which would have been located in the United States), nearly 83 million tons more than in 1980-81. This would have

equaled a 2-month supply of grain, the highest global stocks-to-use ratio in more than a decade.

U.S. stocks of nearly all major commodities have increased dramatically. By the end of the 1982-83 crop year, stocks of rice and coarse grain were estimated to be three times as large as the 1980-81 level. Cotton stocks may have been nearly three times larger. Wheat stocks probably were half again as large, and soybeans stocks may have risen by over one-third.

With stocks too large, production increases too great, and demand too weak for the market to absorb the surplus, U.S. farm exports dropped for the first time in 13 years during the fiscal year ending in September 1982. Volume dropped 2 percent below the previous fiscal year, but value plunged 11 percent because of lower prices. Corn exports were hardest hit, dropping by 10 million metric tons and \$3 billion in value. A large number of countries had financial crises which forced them to curtail food imports. The financial problems of Eastern Europe and Mexico were the most devastating to U.S. trade. U.S. grain exports to these markets plummeted by over 40 percent in 1981-82 and recovered very little in 1982-83.

Against a backdrop of a serious and worsening problem of domestic farm surpluses, a weak overall demand for farm products, and record Government expenditures in support of agriculture, the 1983 acreage-reduction programs were put into place. Even with the voluntary acreage-reduction program (ARP) and the cash paid land diversion (PLD) programs announced for the major 1983 crops in the fall of 1982, forecasters said that stocks would most likely continue to increase for wheat, rice, corn, sorghum, and cotton. As a result, the Government announced the PIK program in January 1983 to idle large amounts of acreage and to reduce surpluses. PIK participants received surplus commodities built up in the farmer-owned reserve or held by the CCC.

The ARP and PLD complemented the program which was aimed at:

- o reducing production and stocks at the same time;
- o ensuring adequate market supplies;
- o minimizing direct Government outlays in support of agriculture;
- o improving conservation practices;
- o increasing farm incomes; and
- o helping to ease storage problems.

The 1983 ARP, PLD, and PIK programs gave farmers a number of options. Farmers could have chosen not to participate in any of the programs. Farmers participating in the ARP and PLD programs were required to idle up to 20 percent of their acreage. The two programs required that this idled acreage be planted with a cover crop to minimize erosion.

Farmers participating in the ARP and PLD programs also had the option of idling an additional 10 to 30 percent of their base acreage and allocating it to a conservation use if they agreed to participate in the PIK program. As compensation, they received in-kind payments on their PIK acres equal to a percentage (usually 80 to 95 percent depending on the commodity) of their farm program yield established by the Agricultural Stabilization and Conservation Service (ASCS). Finally, farmers could have submitted sealed bids indicating the percentage of their program yield acceptable as in-kind compensation for idling their entire base acreage. However, no more than 45 percent of the acreage base for any one commodity was allowed to be removed from production in a county.

Responding to the poor outlook for commodity prices and prospective markets in 1983, farmers planted 14 percent fewer acres, as they made extensive use of the various acreage-limitation programs (table 1). Farmers cut wheat acreage 11 percent from a year earlier, winter wheat plantings were off 5 percent, and spring wheat acreage fell 31 percent. Total feed grain seedings dropped 15 percent, including a 26-percent cut in corn plantings. Cotton and rice plantings declined 30 and 34 percent, respectively.

Enterprise  
Costs and  
Returns

Inflation during 1983, as measured by the CPI, improved--averaging 3.2 percent compared with 6.1 percent in 1982. The prices farmers paid for their production items increased 2 percent, slightly below the rate of inflation in the rest of the U.S. economy, but the average prices received by farmers increased 20 percent for feed grains and hay, 16 percent for oil crops, and 1 percent for food grains; livestock prices fell an average of 3 percent (table 2 and fig. 5).

Not all farm operators were affected equally by the changes in input prices because each commodity required a specific mix of inputs for production. Input prices have not followed the same trends during the past few years. Feed prices rose about 10 percent in 1983, and feeder livestock prices fell

Table 1--Acreage for selected crops, 1980-83 1/

Year	Corn	Sorghum	Winter wheat	Spring wheat	Cotton	Rice
<u>Million acres</u>						
1980	84.0	15.6	57.8	23.0	14.5	3.4
1981	84.1	15.9	65.5	22.7	14.3	3.8
1982	81.9	16.0	65.5	20.7	11.3	3.3
1983	60.2	11.7	62.1	14.3	7.9	2.2

1/ Planted acreage, except harvested acreage for winter wheat.



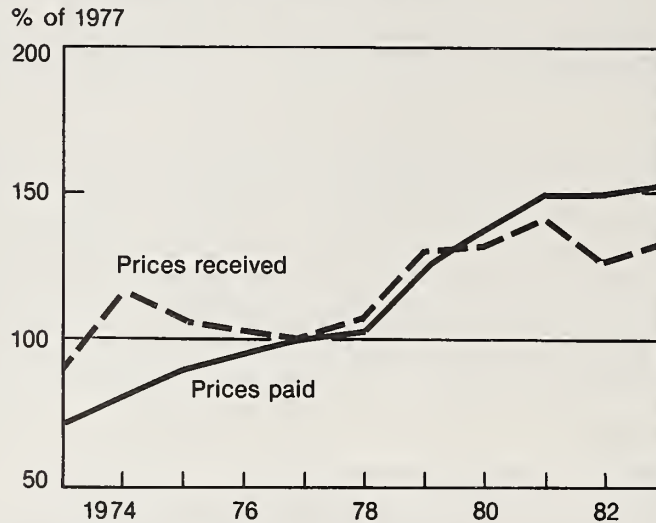
Table 2—Indexes of prices received and paid by farmers, 1978-83

Item	:	:	:	:	:	:	:	:	:
	:	1978	1979	1980	1981	1982	1983	Percentage change—	
	:	:	:	:	:	:	:	1981-82	1982-83
	:	1977 = 100					Percent		
Prices received:	:								
Crops	:	105	116	125	134	121	127	-9.7	5.0
Food grains	:	122	147	165	166	146	148	-12.0	1.4
Feed grains and hay	:	101	114	132	141	120	144	-14.9	20.0
Oil crops	:	93	103	102	110	88	102	-20.0	15.9
Cotton	:	91	96	114	111	92	104	-17.1	13.0
Tobacco	:	109	118	125	140	154	147	10.0	-4.5
Fruits	:	137	144	124	130	175	126	34.6	-28.0
Vegetables	:	105	110	113	136	127	131	-6.6	3.1
Livestock	:	124	147	144	143	145	141	1.4	-2.8
Meat animals	:	134	166	156	150	155	147	3.3	-5.2
Poultry and eggs	:	106	111	112	116	110	118	-5.2	7.3
Dairy products	:	109	124	135	142	140	140	-1.4	0
All farm products	:	115	132	134	139	133	134	-4.3	.8
Prices paid:	:								
Production items	:	108	125	138	148	150	153	1.4	2.0
Feed	:	98	110	123	134	122	134	-9.0	9.8
Feeder livestock	:	140	185	177	164	164	160	0	-2.4
Seed	:	105	110	118	138	141	141	2.2	0
Fuels and energy	:	105	137	188	213	210	202	-1.4	-3.8
Fertilizer	:	100	108	134	144	144	137	0	-4.9
Agricultural chemicals	:	94	96	102	111	119	125	7.2	5.0
Farm and motor supplies	:	104	115	134	147	153	152	4.1	-.7
Autos and trucks	:	106	117	123	143	159	170	11.2	6.9
Tractors and self-propelled machinery	:	109	122	136	152	165	174	8.6	5.5
Other farm machinery	:	108	119	132	146	160	171	9.6	6.9
Building and fencing	:	108	118	128	134	135	138	.7	2.2
Farm services and cash rent	:	107	117	125	137	145	147	5.8	1.4
Farm wage rates	:	107	117	126	137	143	147	4.4	2.8
Farm origin items	:	114	137	143	145	139	144	-4.1	3.6
Nonfarm-origin items	:	106	120	137	152	160	165	5.3	3.1
Production items, interest, taxes, wages	:	109	125	139	151	155	159	2.6	2.6
Commodities, services, interest, taxes, wages	:	108	123	138	150	157	161	4.7	2.5
Ratio of prices received to prices paid 1/	:	106	107	97	93	85	84	-8.6	-1.2

1/ Index of prices received by farmers for all farm products divided by prices paid by farmers for commodities, services, interest, taxes, and wages.

Figure 5

### Prices Received and Paid by Farmers



Prices paid includes commodities and services, interest, taxes, and wage rates.

more than 2 percent. At the same time, the prices of most manufactured or nonfarm origin inputs (except for fuels and fertilizer) continued to rise, though at a reduced rate when compared with 1982 and 1981 (table 2).

Cost-of-production (COP) estimates measure national weighted average costs and returns on a per-unit basis. For crops the unit is the planted acre; for livestock it is hundredweight (cwt) or animal unit, depending on the enterprise. Crop yields are also on a planted-acre basis and prices received by farmers are those at month of harvest. Yields were down for 10 of the 11 major crops for which costs of production were estimated (wheat, which escaped drought for the most part, showed yields up 11 percent and prices up slightly). Corn and soybean yields dropped most, 28 percent and 20 percent, respectively. The resulting lower level of reserve stocks caused market prices to increase for all crops except peanuts, down only 4 percent.

The estimation of cash receipts omits direct Government payments (like PIK), except for wool. In the peanut, milk, and wool programs, the product price is supported by the Government through direct market intervention. As a result,



the value of production reflects the combined market price and masks Government payments. In contrast, most crop price support programs including PIK are voluntary and contain special provisions for compliance. Both program payments and the costs of compliance need to be excluded when policy-makers use cost and return information to determine if support prices will encourage or maintain production at adequate levels.

Feed prices for corn, grain, and protein supplements increased in 1983 following a decline in 1982. For many livestock and milk producers, feed accounts for nearly half of total production costs. However, interest costs increased only 2 percent throughout the year which reduced borrowing and ownership costs.

Tables 3 to 7 summarize 1982 and estimated 1983 preliminary per-unit production costs and returns for major U.S. crop and livestock commodities. Beginning in 1984, the Economic Research Service (ERS) is introducing a new format for COP estimates. To provide more comprehensive statistics, net return estimates have been added as well as more detail on input costs. Because cash receipts are now included in the budgets, residual returns to management and risk, or allocated returns to owned resources, may be estimated more accurately. Cash expenses and economic costs are also separated, so short- and long-term returns can be determined. Finally, because economic costs are now presented separately, information is available to show how producers may allocate remaining cash returns to owned inputs (a purely managerial rather than accounting decision).

Cost determinations can differ considerably and still be valid for particular purposes and circumstances. The costs are national averages for crop and livestock production based on an average acre of land, animal unit, or cwt of production. COP estimates are indicators of year-to-year changes in production costs and are not adequate for assessing a farm's total income (from multiple enterprises) nor a particular farm operator's current cash situation. COP estimates are based on a set of national and regional budgets produced and updated by computerized budget-generator and aggregation programs. These budgets are, in turn, based primarily on data from producer surveys repeated every 4 or 5 years for each major commodity.

The 1983 estimates for crops show that residual returns to management and risk improved for all crops except peanuts and oats. Livestock producers, mainly hog and milk producers, showed declines in residual returns to management and risk in 1983. On average, the prices livestock producers received for their products fell: steers down about 2.4 percent, calves up about 3 percent, and hogs down 15 percent. Returns to management and risk for hog producers decreased between \$8 and \$34 per cwt, \$4.63 for cattle, and 47 cents for milk.

Table 3--Production costs and returns for U.S. feed grains, 1982-83

Item	Corn		Sorghum		Barley		Oats	
	1982	1983	1982	1983	1982	1983	1982	1983
	<u>Dollars/planted acre</u>							
Total cash receipts	245.55	258.70	121.78	130.87	121.88	120.79	106.64	98.12
Cash expenses:								
Total variable 1/	132.15	125.77	67.92	66.65	57.64	53.43	42.80	39.68
Total fixed 2/	82.09	84.85	38.96	40.77	38.01	38.61	30.32	31.51
Total cash expenses	214.24	210.62	106.88	107.42	95.65	92.04	73.12	71.19
Receipts less cash expenses	31.31	48.07	14.90	23.45	26.23	28.75	33.52	26.93
Capital replacement	30.90	31.65	29.36	31.04	27.81	29.22	19.82	21.14
Receipts less cash expenses and replacement	.41	16.43	-14.46	-7.59	-1.58	-.47	13.70	5.79
Economic costs:								
Variable expenses 1/	132.15	125.77	67.92	66.65	57.64	53.43	42.80	39.68
General farm overhead	16.11	16.39	8.16	8.31	8.48	8.22	4.75	4.83
Taxes and insurance	16.55	17.23	8.23	8.55	8.65	9.39	11.74	12.38
Capital replacement	30.90	31.65	29.36	31.04	27.81	29.22	19.82	21.14
Allocated returns to owned inputs:								
Operating capital (equity)	6.00	4.64	2.85	2.21	1.82	1.37	1.28	.95
Other nonland capital	12.24	12.27	10.84	11.28	10.50	10.94	7.69	8.10
Net land rent	61.43	61.43	26.39	28.30	29.39	30.01	33.43	30.52
Labor 3/	15.33	14.50	14.52	13.66	11.85	12.28	13.23	13.00
Residual to management and risk	-45.16	-25.18	-46.49	-39.13	-34.26	-34.07	-28.10	-32.48
Net returns to owned inputs	49.84	67.66	8.11	16.32	19.30	20.53	27.53	20.09
	<u>Dollars/bushel 4/</u>							
Price	2.14	3.21	2.10	2.85	2.15	2.34	1.41	1.45
	<u>Bushels/planted acre 4/</u>							
Yield	114.66	80.50	57.88	45.89	54.61	49.79	56.48	50.11

See footnotes at end of table 5.

Table 4--Production costs and returns for U.S. food grains and cotton, 1982-83

Item	Wheat		Rice		Cotton	
	1982	1983	1982	1983	1982	1983
	<u>Dollars/planted acre</u>					
Total cash receipts	112.27	131.99	356.65	400.19	354.54	374.09
Cash expenses:						
Total variable 1/	52.22	52.05	240.12	237.29	210.42	198.73
Total fixed 2/	33.47	35.86	91.89	94.39	89.61	89.13
Total cash expenses	85.69	87.91	332.01	331.68	300.03	287.86
Receipts less cash expenses						
Capital replacement	26.58	44.08	24.64	68.51	54.51	86.23
Receipts less cash expenses and replacement	20.98	22.96	46.83	49.73	42.22	44.34
	5.60	21.12	-22.19	18.78	12.29	41.89
Economic costs:						
Variable expenses 1/	52.22	52.05	240.12	237.29	210.42	198.73
General farm overhead	7.04	7.35	23.20	23.14	23.74	23.12
Taxes and insurance	7.39	8.28	10.11	10.83	9.40	9.78
Capital replacement	20.98	22.96	46.83	49.73	42.22	44.34
Allocated returns to owned inputs:						
Operating capital (equity)	3.13	2.47	8.90	6.97	7.79	5.86
Other nonland capital	7.68	8.38	16.76	17.65	14.03	14.61
Net land rent	28.65	34.00	53.25	63.72	55.87	61.57
Labor 3/	10.05	10.75	35.36	35.19	32.83	32.38
Residual to management and risk	-24.87	-14.25	-77.88	-44.33	-41.76	-16.30
Net returns to owned inputs	24.64	41.35	36.39	79.20	68.76	98.12
	<u>Dollars/bushel 4/</u>					
Price	3.38	3.48	7.61	8.79	.58	.66
	<u>Bushels/planted acre 4/</u>					
Yield	32.54	37.01	46.86	45.53	550.99	465.48

See footnotes at end of table 5.



Table 5--Production costs and returns for U.S. oilseed crops, 1982-83

Item	Soybeans		Sunflowers		Peanuts		Flax	
	1982	1983	1982	1983	1982	1983	1982	1983
	<u>Dollars/planted acre</u>							
Total cash receipts	161.65	200.48	96.67	124.26	668.05	572.56	72.22	78.58
Cash expenses:								
Total variable 1/	58.49	55.66	47.99	46.52	281.20	280.61	28.55	26.42
Total fixed 2/	48.04	50.78	28.52	29.10	138.62	145.63	22.88	23.13
Total cash expenses	106.53	106.44	76.51	75.62	419.82	426.24	51.43	49.55
Receipts less cash expenses	55.12	94.04	20.16	48.64	248.23	146.32	20.79	29.03
Capital replacement	22.44	23.68	22.44	23.63	47.64	50.73	19.42	20.79
Receipts less cash expenses and replacement	32.68	70.36	-2.28	25.01	200.59	95.59	1.37	8.24
Economic costs:								
Variable expenses 1/	58.49	55.66	47.99	46.52	281.20	280.61	28.55	26.42
General farm overhead	8.70	8.98	5.47	5.49	27.18	27.84	4.07	4.10
Taxes and insurance	11.10	12.19	6.63	6.71	9.84	10.73	6.62	6.49
Capital replacement	22.44	23.68	22.44	23.63	47.64	50.73	19.42	20.79
Allocated returns to owned inputs:								
Operating capital (equity)	3.08	2.34	2.10	1.61	11.67	9.49	1.11	.82
Other nonland capital	8.28	8.64	8.67	9.04	18.21	19.17	7.32	7.73
Net land rent	51.43	64.06	27.41	31.84	92.62	83.86	25.20	26.64
Labor 3/	14.66	14.62	7.75	7.97	30.78	30.89	7.28	7.31
Residual to management and risk	-16.53	10.31	-31.79	-8.55	148.91	59.24	-27.35	-21.72
Net returns to owned inputs	60.92	99.97	14.14	41.91	302.19	202.65	13.56	20.78
	<u>Dollars/bushel 4/</u>							
Price	5.13	7.96	8.76	12.10	.25	.24	5.34	6.89
	<u>Bushels/planted acre 4/</u>							
Yield	31.52	25.19	11.04	10.27	2,645.19	2,336.48	13.53	11.41

1/ Includes seed, fertilizer, lime, chemicals, custom operations, fuel and lubrication, repairs, drying, purchased irrigation water, and management fees. 2/ Includes: taxes and insurance, general overhead, and cash interest paid on operating capital and land and nonland capital. 3/ Includes hired labor (a cash expense) and unpaid labor; they could not be separately identified given available survey data. 4/ The unit for cotton is pounds and for sunflowers hundredweight.

Table 6--Production costs and returns for U.S. beef and dairy, 1982-83

Item	Cow-calf		Fed cattle		Milk/cwt		Milk/cow	
	1982	1983	1982	1983	1982	1983	1982	1983
	---Dollars/cow---		---Dollars/cwt---		---Dollars/cwt---		---Dollars/cow---	
Total cash receipts	255.49	247.18	63.62	62.12	14.66	14.68	2,017.15	2,066.68
Cash expenses:								
Total variable 1/	181.43	181.89	59.10	62.74	7.39	8.02	1,019.55	1,129.23
Total fixed 2/	80.63	78.26	5.42	4.84	2.47	2.52	340.02	354.71
Total cash expenses	262.06	260.15	64.52	67.58	9.86	10.54	1,359.57	1,483.94
Receipts less cash expenses	-6.57	-12.97	-	-5.46	4.80	4.14	657.58	582.74
Capital replacement	62.88	65.38	1.25	1.21	1.57	1.58	216.07	222.47
Receipts less cash expenses and replacement	-69.45	-78.35	-2.15	-6.67	3.23	2.56	441.51	360.27
Economic costs:								
Variable expenses 1/	181.43	181.89	59.10	62.74	7.39	8.02	1,019.55	1,129.23
General farm overhead	13.01	13.43	.29	.30	.57	.57	78.53	80.82
Taxes and insurance	20.87	22.23	.19	.18	.35	.36	48.17	50.69
Capital replacement	62.88	65.38	1.25	1.21	1.57	1.58	216.07	222.47
Hired management			.13	.14				
Allocated returns to owned inputs:								
Operating capital	12.61	10.05	1.63	1.31	.12	.10	16.82	14.36
Other nonland capital	46.08	46.83	.51	.48	1.04	.95	143.13	133.77
Land	142.61	134.22	.25	.20	.36	.36	49.54	50.69
Unpaid labor	71.71	74.72	.60	.52	1.51	1.46	207.98	205.67
Residual to management and risk	-295.71	-301.57	-.33	-4.96	1.75	1.28	237.36	178.98
Net returns to owned inputs	-22.70	-35.75	2.66	-2.45	4.78	4.15	654.83	583.47

See footnotes at end of table 7.

Table 7--Production costs and returns for U.S. hogs and sheep, 1982-83

Item	Feeder pig		Feeder pig		Farrow to		Sheep	
	production		finishing		finish			
	1982	1983	1982	1983	1982	1983	1982	1983
	-----Dollars/cwt-----						---Dollars/ewe---	
Total cash receipts	95.23	69.51	54.53	47.34	54.47	46.92	47.20	46.89
Cash expenses:								
Total variable 1/	56.42	62.61	43.52	44.39	32.75	37.67	28.53	29.25
Total fixed 2/	19.41	18.51	6.16	5.66	10.15	9.59	13.61	12.75
Total cash expenses	75.83	81.12	49.68	50.05	42.90	47.26	42.14	42.00
Receipts less cash expenses	19.40	-11.61	4.85	-2.71	11.57	-.34	5.06	4.89
Capital replacement	12.36	13.35	2.92	3.04	5.81	6.19	1.71	1.82
Receipts less cash expenses and replacement	7.04	-24.96	1.93	-5.75	5.76	-6.53	3.35	3.0
Economic costs:								
Variable expenses 1/	56.42	62.61	43.52	44.39	32.75	37.67	28.53	29.25
General farm overhead	3.71	3.83	1.11	1.15	1.56	1.61	1.23	1.27
Taxes and insurance	1.89	2.10	.39	.42	.69	.78	1.80	1.84
Capital replacement	12.36	13.35	2.92	3.04	5.81	6.19	1.71	1.82
Allocated returns to owned inputs:								
Operating capital	2.09	1.80	.83	.66	1.05	.93	1.84	1.46
Other nonland capital	5.81	6.23	1.22	1.24	2.41	2.52	4.52	3.95
Land	2.25	1.92	.10	.09	.43	.36	11.54	11.90
Unpaid labor	19.29	20.54	1.53	1.62	5.13	5.47	7.14	7.33
Residual to management and risk	-8.59	-42.87	2.91	-5.27	4.64	-8.61	-11.11	-11.93
Net returns to owned inputs	20.85	-12.38	6.59	-1.66	13.66	.67	13.93	12.71

1/ Includes feed, veterinary fees and medicine, marketing, bedding, custom feed mixing, fuels, machinery and building repairs, hired labor, and manure credit. 2/ Includes taxes and insurance, general overhead, and interest paid on land and nonland capital.



Corn's per-acre receipts increased while cash expenses decreased. Net returns to owned inputs increased to \$68 per acre in 1983 from \$50 in 1982. Grain sorghum yields declined 21 percent in the two major growing regions, but a 36-percent price increase pushed net returns to \$16 per acre. Barley showed 9-percent lower yields but a 9-percent price increase, so net returns to owned inputs increased slightly to \$21. Oats yields were almost identical to barley yields; net returns decreased to \$20. Net returns on wheat increased by 18 percent in 1983. Rice yields fell only slightly, but prices increased by 16 percent, leading to a 12-percent increase in receipts and a \$43 increase in net returns. Cotton receipts for lint fell 3 percent but cottonseed prices increased 85 percent with the net result that per-acre receipts increased about 6 percent. Soybeans rivaled corn in reduced yields, but higher prices offset the downturn, providing increased receipts of \$200, up about \$39 per acre. Sunflower prices were up 38 percent giving a 29-percent increase in receipts. Peanuts, the only crop to experience a decline in net returns from 1982 levels, showed a 12-percent yield decrease and a small price decline, which will probably lead to a 14-percent decrease in net returns. Flax, small in overall production, showed increased returns, a strong cash position, and nearly double the 1982 net returns.

The 1983 livestock and dairy picture differed from that for crops. Cow-calf receipts fell 3 percent. Because of much higher costs from higher feed prices, receipts less cash expenses and replacement declined by about \$9 per cow; net returns fell to a minus \$36 per cow. The fed beef situation was similar to cow-calf operations, a decrease in cash receipts and negative net returns. Dairy gross receipts increased 2 cents in 1983 to \$14.68 per cwt of milk, but net returns per cwt fell to \$4.15. Hogs received lower receipts and experienced higher costs of production. The cash position (receipts less expenses and replacement) of farrow-to-finish operators went from \$5.76 per cwt in 1982 to a minus \$6.53 per cwt in 1983. Sheep ranchers' high net returns 4 years ago gave way to a continuing slide as net returns dropped from \$13.93 to \$12.71.

#### Aggregate Production Expenses

One of the most significant impacts of the PIK and acreage-control programs in 1983 was the large reduction in farm inputs which triggered the drop in production expenses. Acreage reduction was the major force behind the 3-percent decline in 1983 farm production expenses. Expenses, which had declined only twice since 1940 (1949 and 1953), totaled \$135.3 billion compared with \$139.5 billion in 1982 (table 8). The increase in prices paid by farmers for all items, mirroring the moderation in the general inflation rate, slowed to about 3 percent in 1983.

Nearly all expenses associated with crop production declined because of reduced planted acreage. Outlays fell for fertilizer, fuels, labor, seeds, repairs, and machine hire and custom expenses. Total farm input use in 1983 declined

Table 8—Farm production expenses including households, 1978-83

Item	:	:	:	:	:	:	: Percent change—	
	: 1978	: 1979	: 1980R	: 1981R	: 1982R	: 1983	:	
	:	:	:	:	:	:	: 1981-82 : 1981-83	
	: ————— Million dollars —————						—Percent—	
Feed	: 14,466	17,655	18,783	18,755	16,855	18,963	-10.1	12.5
Livestock and poultry	: 10,150	12,626	10,441	8,996	9,684	8,792	7.6	-9.2
Seed	: 2,638	2,960	3,351	3,930	3,985	3,468	1.4	-13.0
Farm origin inputs	: 27,254	33,241	32,575	31,681	30,524	31,223	-3.7	2.3
Fertilizer	: 6,619	7,530	9,922	10,074	8,817	7,427	-12.5	-15.8
Fuels and oils	: 4,610	6,243	7,876	8,855	8,321	7,652	-6.0	-8.0
Electricity	: 1,389	1,641	1,760	1,975	2,101	2,267	6.4	7.9
Pesticides	: 2,656	3,057	3,306	3,585	3,617	3,515	0.9	-2.8
Manufactured inputs	: 15,274	18,471	22,864	24,489	22,856	20,861	-6.7	-8.7
Short-term interest	: 5,167	6,868	8,717	10,722	11,702	10,367	9.1	-11.4
Real estate interest	: 5,060	6,190	7,544	9,142	10,481	10,875	14.6	3.8
Total interest charges	: 10,227	13,058	16,261	19,864	22,183	21,242	11.7	-4.2
Repairs and operations	: 6,616	7,307	8,074	8,095	8,230	8,174	1.7	-0.7
Hired labor	: 8,348	9,548	10,272	10,168	12,069	11,677	18.7	-3.2
Machine hire and customwork	: 1,776	2,257	2,247	2,768	2,835	2,146	2.4	-24.3
Dairy deductions	: 0	0	0	0	0	640	N/A	N/A
Other expenses	: 5,500	6,343	6,507	7,315	7,977	7,945	9.0	-0.4
Other operating expenses	: 22,240	25,455	27,100	28,346	31,111	30,582	9.8	-1.7
Depreciation	: 16,960	19,170	21,372	23,412	23,604	23,141	0.8	-2.0
Property taxes	: 3,603	3,910	3,942	4,246	4,401	4,588	3.7	4.2
Net rent to nonoperator landlords	: 3,989	4,802	4,833	4,858	4,803	3,684	-1.1	-23.3
Other operating expenses	: 24,552	27,882	30,147	32,516	32,808	31,413	0.9	-4.3
Total production expenses	: 99,547	118,107	128,947	136,896	139,482	135,321	1.9	-3.0

R = Revised. N/A = not applicable.

about 5 percent, the largest year-to-year drop since 1934. Besides the decline in planted acreage, the further reduction in harvested acreage caused by drought losses also contributed to declining input use. Acreage abandonment meant less custom harvesting, lower repair costs, and reduced fuel costs. The smaller corn crop required less fuel for drying, and the reduced cotton crop decreased the amount of ginning required. Expenses for cotton ginning, which were \$521 million in 1982, declined 32 percent to \$354 million in 1983.

Production expenses for farm-origin inputs (feed, purchased livestock, and seed) accounted for 23 percent of total expenses. These expenses, except for seed, are associated with the production of livestock and rose about 2 percent above the \$30.5 billion of 1982. Higher feed prices, a result of the impact on crop production of acreage-reduction programs and the dry summer, combined with a slight rise in feed use to move feed expenses up more than 12 percent.

Outlays for purchases of feeder and replacement livestock fell about 9 percent in 1983 after rising nearly 8 percent in 1982. The number of animals purchased fell when declining inshipments of cattle and sheep more than offset an increase in interstate hog shipments. Feeder livestock prices declined when feeder cattle prices and feeder pig prices each declined.

Seed expenses in 1983 dropped 13 percent because of reductions in planted acreage. Planted acres declined significantly for corn (26 percent), sorghum (27 percent), rice (34 percent), cotton (30 percent), and soybeans (11 percent). Seed prices remained largely unchanged when higher prices for corn, sorghum, and alfalfa offset lower prices for wheat, soybeans, and potatoes.

Expenses for manufactured inputs (fuel, fertilizer, electricity, and pesticides) registered the largest percentage decline because of sharply curtailed use and decreases in fertilizer and fuel prices. Manufactured inputs fell 9 percent from the \$22.9 billion of 1982. Fuel prices declined about 3 percent (the second consecutive annual decline) because of large supplies relative to demand. Combined with a decline in fuel used, fuel expenses declined 8 percent after falling 6 percent in 1982.

Fertilizer expenses fell 16 percent in 1983 from the \$8.8 billion of 1982. Reduced demand, caused mostly by acreage-reduction programs, led to declining fertilizer prices during the year. Meanwhile, pesticide expenses, another farm input derived from petrochemicals, dropped about 3 percent from the \$3.6 billion of 1982, mostly because of reduced use. Pesticide prices rose little during the year, following reduced agricultural demand.

Total farm interest expenses declined 4 percent to \$21.2 billion in 1983. Interest paid on real estate debt rose, but nonreal estate interest expenses declined 11 percent from the \$11.7



billion of 1982. Interest rates charged by farm lenders for short-term credit declined measurably from the 1982 averages. The simple average interest rate for Production Credit Association (PCA) loans was about 11.9 percent in 1983, down from 14.6 percent in 1982 (table 9). Although total nonreal estate debt outstanding on January 1, 1984, fell 3 percent to \$103.2 billion, average nonreal estate debt outstanding increased somewhat. Thus all the decline in nonreal estate interest expenses resulted from lower interest rates paid on the outstanding debt, the first year-to-year decline in nonreal estate interest expenses since 1954. The percentage of total expenses accounted for by short-term interest charges, which measured 7.8 and 8.4 percent in 1981 and 1982, respectively, declined to 7.7 percent in 1983.

Although long-term interest rates have declined recently, the drop did not substantially affect the average rate on real estate debt outstanding in 1983, because of the longer turnover time for real estate debt. Average real estate debt, like nonreal estate debt, rose at a reduced pace compared with the last few years. Real estate interest expenses rose 4 percent to \$10.9 billion and accounted for 8 percent of total expenses.

Because of a substantial drop in capital expenditures during the past few years, depreciation of farm capital declined 2 percent in 1983, the first drop since 1946. The continuing substitution of machinery for labor, together with rising machinery prices, had caused depreciation, measured at replacement value, to rise substantially until recently. Capital expenditures fell 16 percent in 1982 and another 7 percent in 1983.

#### Weather Developments

Weather-related reductions in acreage, yields, and production affected many crops in 1983. Early in the year, mild temperatures prevailed over most of the Nation. Heavy snows from the Southern Plains through the Corn Belt forced livestock producers to use larger than normal amounts of feedstuffs in February. However, mild temperatures at the end of the month melted most of the snow covers in the North and helped growth of crops and pastures in the South. Heavy precipitation was widespread in the Southwest and hindered land preparation and planting. In the Southwest, cotton land was prepared, but elsewhere the ground was too wet for tilling and planting. By the end of the month, the weather permitted corn planting in the extreme South from Texas to Florida. During March excessive wet weather in the Southeast and California delayed fieldwork and damaged crops. Heavy snow added to the western mountain range snowpack. In the Central Plains and the Corn Belt, needed rain and snow replenished soil moisture but slowed small grain seeding.

Spring was cool and wet over a large portion of the Nation. In late April, freezing temperatures in Alabama, Georgia, and the Carolinas severely damaged fruits and vegetables. Most of the Nation was wetter than normal from persistent rains and heavy snowpack melts along western mountain watersheds.

Table 9—Farm interest expenses, 1978-83

Item	1978	1979	1980	1981	1982	1983
Percent						
Selected interest rates:						
Average on new loans—						
Federal Land Banks	8.35	9.16	10.39	11.27	12.27	11.63
Production Credit Associations	8.83	10.71	12.74	14.46	14.58	11.95
Prime rate	9.06	12.67	15.27	18.87	14.86	10.79
Average on outstanding farm debt:						
Real estate	7.51	7.89	8.34	9.09	9.75	9.84
Nonreal estate	8.02	9.17	10.45	11.75	11.53	9.88
Total debt	7.76	8.52	9.35	10.36	10.61	9.86
Billion dollars						
Average debt outstanding:						
Real estate 1/	67.36	78.42	90.47	100.54	107.52	110.57
Nonreal estate 1/, 2/	64.42	74.89	83.41	91.28	101.47	104.91
Total	131.78	153.31	173.88	191.82	208.99	215.48
Million dollars						
Interest expenses:						
Real estate 1/	5,060	6,130	7,544	9,142	10,481	10,875
Nonreal estate 1/, 2/	5,167	6,868	8,717	10,722	11,702	10,367
Total	10,227	12,998	16,261	19,864	22,183	21,242
Percent						
Percentage change in—						
Average interest rate	N/A	9.8	9.7	10.8	2.4	-7.1
Debt outstanding	N/A	16.3	13.4	10.3	9.0	3.1
Interest paid	N/A	27.1	25.1	22.2	11.7	-4.2

N/A = not applicable. 1/ Includes farm household debt. 2/ Includes CCC debt.

In late spring and early summer, extensive flooding plagued the Mississippi Delta, Tennessee Valley, lower Ohio Valley, and most western river areas causing severe damage.

As summer progressed, dry weather and searing heat severely stressed crops and livestock pasture over wide areas of the country. In much of the Corn Belt, these conditions prevailed during the fertilization period and slashed corn yields, resulting in a 1.6-billion-bushel drop in the estimated corn crop for 1983 (fig. 6).

All States east of the Mountain region, except for North Dakota, suffered corn yield declines, and all States in the Pacific and Mountain regions, except for Colorado, had corn yield increases.

### Productivity

The U.S. index of farm output in 1983 is estimated to have fallen 15 percent from 1982's near-record level. An estimated 26-percent drop in crop production sharply offset a 3-percent gain in livestock output.

Agriculture's output in 1983 followed 2 years when American farmers produced as never before. A slight decrease in 1982 left U.S. farm output about 1 percent below the previous 1981 record. Livestock production was down, offsetting crop production increases. Crop production, however, was record high in 1982, 2 percent above the previous 1981 record on about the same acreage of cropland. Record production and yields for individual commodities were unusually prevalent in 1982. Quantities produced and yields per acre were both higher than ever before for corn, barley, wheat, hay, and soybeans.

In contrast to the drop in livestock production in 1982, total livestock production in 1983 was estimated to be the highest on record, 3 percent above 1982 and 10 percent above 1977 levels. Cattle and calf production changed very little while hogs and dairy products increased 8 and 3 percent, respectively. A slight increase was seen for sheep and lambs.

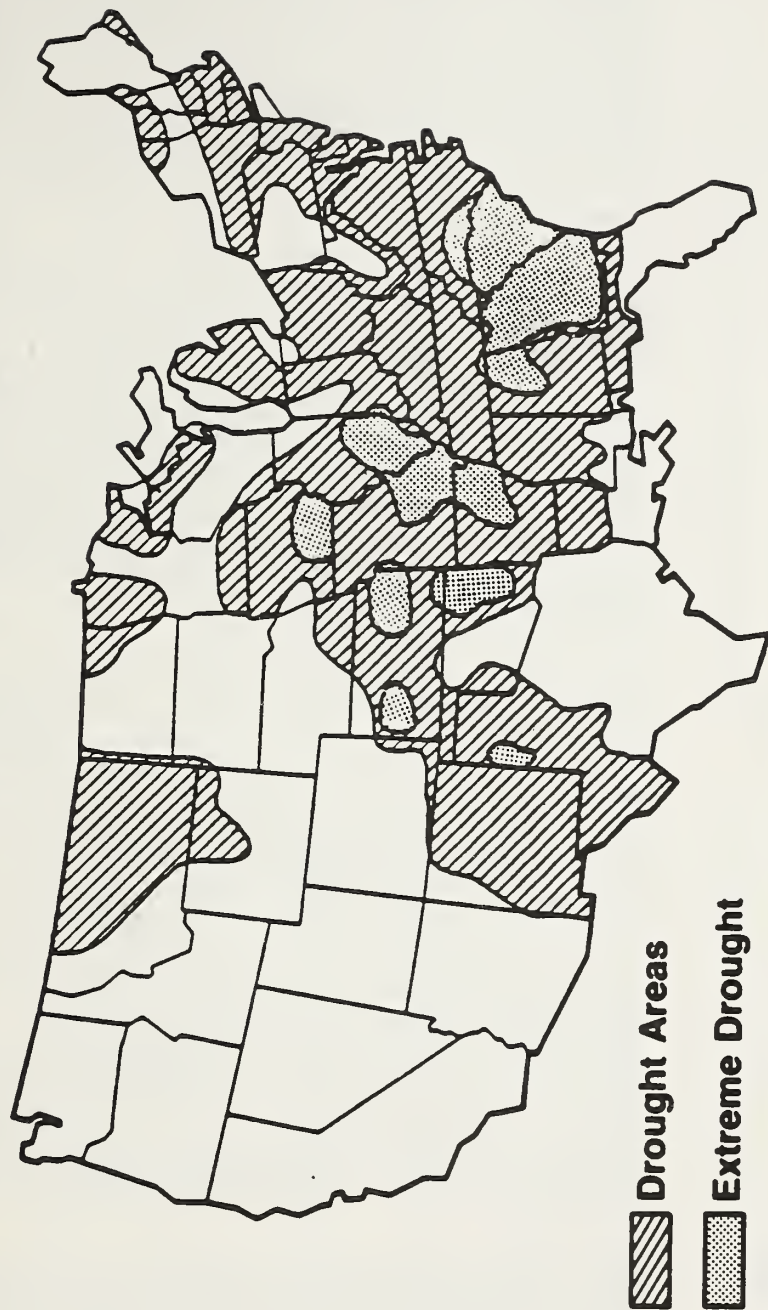
The crop production index, a time series starting in 1910, indicated that overall crop production, at 26 percent, likely fell further in 1983 than ever before because of substantial reductions in acres harvested and yields per acre. About 65 million cropland acres, or 14 percent of all cropland, lay unplanted in 1983 mainly as a result of participation in the PIK and other farm acreage-reduction programs. The index of crop production per acre declined 16 percent because drought and poor summer weather conditions caused extensive crop damage over wide areas of the country.

Input use was also down in 1983 because of participation in PIK and other agricultural programs. Estimates of the total quantity of farm inputs used in the United States for agricultural production in 1983, as measured by the index of total farm inputs, were 4 to 6 percent lower than in 1982.



Figure 6

## States Affected by 1983 Drought



Based on CMI Through August 20, 1983

Taken together, the 15-percent decline in farm output and the 5-percent decline in farm input use decreased productivity by about 9 percent in 1983.

#### Marketing Developments

By January 1983, prices received for all major crops had moved only marginally above harvesttime levels, reflecting a large supply, relatively weak marketings, and the prospect for large carryout stocks. After announcement of the PIK program in January, however, crop prices slowly began to rise, gradually reaching a plateau in early summer. With the onset of dry weather and the attendant prospects for yield reductions, crop prices once again began to climb, some dramatically. These increased prices strengthened overall crop receipts. But higher feed prices and reduced forage supplies placed pressure on livestock prices and receipts during the second half of the year. After aggregating the impacts of the price changes on crop and livestock receipts, the net effect was positive for cash receipts.

Prices received by farmers for all commodities in 1983 averaged about 1 percent more than a year earlier, reflecting the changed supply and demand balance. Crop prices averaged about 5 percent higher as strong prices for feed grains and hay (up 20 percent), oil crops (up 16 percent), and cotton (up 13 percent), overwhelmed lower fruit prices (off 28 percent) and small increases in food grain (up 1 percent) and vegetable prices (up 3 percent). Prices received for livestock and products fell 3 percent in 1983 when lower prices for meat animals (down 5 percent) offset increased poultry and egg prices (up 7 percent).

#### Income Developments

Farm income estimates measure the combined effects of changing prices, production, sales, and production costs in the farm business. All the major economic, biological, and policy forces bearing on the economic situation of farm operators are mirrored in the estimates of farm income. Entering 1983, the combined effect of large crop and livestock supplies and little prospect for substantial increases in demand suggested a 1983 farm income level well below that of 1982. But significant events, such as drought, brought major revisions in the outlook for prices, production, sales, and production expenses, leading to an income situation that could best be described as both volatile and diverse. Changes in the U.S. economic situation, world economic conditions, farm programs, and drought in major U.S. production regions, especially the Midwest, most affected 1983's farm income. Of the four factors mentioned, the drought and farm programs had the largest effect on the income and cash flow situation of farmers.

#### Cash Receipts

Total cash receipts from marketings of farm products in 1983 declined about 4.2 percent from the 1982 level of \$144.8 billion when crop receipts decreased 6.8 percent to about \$69.5 billion, and livestock receipts, at \$69.2 billion, fell 1.3 percent from 1982 (table 10). For livestock, lower prices received offset increased marketings. Production

Table 10—Cash receipts by commodity, 1978-83 1/

Receipts	: 1978	: 1979	: 1980	: 1981	: 1982	: 1983	: Percent change—	
	:	:	:	:	:	:	: 1981-82 : 1982-83	
	: Million dollars						Percent	
Crop receipts:								
Food grains 2/	: 5,839	: 9,047	: 10,386	: 11,616	: 11,548	: 9,956	-0.6	-13.8
Wheat	: 4,689	: 7,823	: 8,836	: 9,848	: 9,990	: 9,018	1.4	-9.7
Rice	: 1,141	: 1,188	: 1,519	: 1,729	: 1,515	: 874	-12.4	-42.3
Rye	: 36	: 36	: 30	: 39	: 43	: 64	10.3	48.8
Feed grains and hay	: 11,427	: 14,042	: 18,318	: 17,144	: 18,274	: 16,808	6.6	-8.0
Corn	: 8,246	: 10,283	: 13,966	: 12,790	: 13,543	: 12,193	5.9	-10.0
Oats	: 281	: 272	: 303	: 373	: 346	: 341	-7.2	-1.4
Barley	: 607	: 647	: 736	: 864	: 806	: 962	-6.7	19.4
Grain sorghum	: 905	: 1,169	: 1,394	: 1,259	: 1,570	: 1,106	24.7	-29.6
All hay	: 1,389	: 1,670	: 1,918	: 1,857	: 2,010	: 2,207	8.2	9.8
Oil crops	: 13,023	: 14,326	: 15,497	: 13,857	: 13,961	: 13,300	.8	-4.7
Soybeans	: 11,822	: 12,964	: 14,246	: 12,247	: 12,661	: 12,008	3.4	-5.2
Peanuts	: 835	: 831	: 606	: 1,048	: 818	: 787	-21.9	-3.8
Other oil crops	: 366	: 531	: 645	: 562	: 482	: 505	-14.2	4.8
Cottonlint and seed	: 3,465	: 4,305	: 4,478	: 4,551	: 4,948	: 4,283	8.7	-13.4
Tobacco	: 2,604	: 2,271	: 2,672	: 3,250	: 3,342	: 2,831	2.8	-15.3
Fruits and nuts	: 5,764	: 6,436	: 6,535	: 6,561	: 6,726	: 6,153	2.5	-8.5
Vegetables	: 5,941	: 6,454	: 7,285	: 8,743	: 8,065	: 8,233	-7.8	2.1
Other crops	: 5,645	: 6,293	: 7,538	: 7,620	: 7,759	: 7,953	1.8	2.5
Subtotal, crops	: 53,708	: 63,174	: 72,707	: 73,342	: 74,623	: 69,516	1.7	-6.8
Livestock receipts:								
Red meats	: 37,455	: 43,901	: 40,855	: 39,779	: 40,940	: 38,826	2.9	-5.2
Cattle	: 26,197	: 31,634	: 28,947	: 27,417	: 27,935	: 26,649	1.9	-4.6
Calves	: 2,051	: 2,766	: 2,518	: 2,161	: 1,971	: 2,045	-8.8	3.8
Hogs	: 8,754	: 9,027	: 8,921	: 9,785	: 10,586	: 9,714	8.2	-8.2
Sheep and lambs	: 453	: 474	: 470	: 416	: 447	: 418	7.5	-6.5
Poultry and eggs	: 8,110	: 8,925	: 9,157	: 9,949	: 9,534	: 9,960	-4.2	4.5
Broilers	: 3,715	: 4,025	: 4,305	: 4,650	: 4,482	: 4,849	-3.6	8.2
Turkeys	: 1,156	: 1,215	: 1,269	: 1,247	: 1,246	: 1,262	-.1	1.3
Eggs	: 2,939	: 3,328	: 3,247	: 3,649	: 3,437	: 3,443	-5.8	.2
Other poultry	: 300	: 356	: 336	: 405	: 369	: 406	-8.9	10.0
Dairy products	: 12,724	: 14,650	: 16,587	: 18,128	: 18,273	: 18,808	.8	2.9
Wholesale milk	: 12,445	: 14,354	: 16,274	: 17,797	: 17,985	: 18,530	1.1	3.0
Retail milk	: 279	: 296	: 312	: 331	: 288	: 278	-13.0	-3.5
Other livestock	: 873	: 1,118	: 1,201	: 1,358	: 1,392	: 1,609	2.5	15.6
Subtotal, livestock	: 59,162	: 68,594	: 67,800	: 69,214	: 70,139	: 69,203	1.3	-1.3
Total receipts	: 112,870	: 131,768	: 140,507	: 142,557	: 144,762	: 138,719	1.5	-4.2

1/ Preliminary.



increased for pork, up 7 percent, beef, up 3 percent, and broilers, up 2 percent (table 11). Higher average prices for crops were more than offset by a significant reduction in the volume of crops marketed during the second half of the year.

In the livestock sector, lower cash receipts from cattle and hogs in 1983 outweighed higher receipts from broilers, calves, turkeys, and milk. Cash receipts for cattle dropped about 5 percent when a 2-percent reduction in the farm price of cattle combined with a reduction in marketings. Although general economic conditions improved real per capita income during 1983, large total meat supplies left the average farm price for cattle at \$55.83 per cwt, it's lowest nominal level since 1978.

Crop cash receipts in 1983 fell to \$69.5 billion, reflecting the large decline in crop production. Receipts declined for every major crop category except barley, hay, vegetables, and greenhouse and nursery. Farmers who participated heavily in the acreage reduction programs may have either delayed marketings until 1984 or attempted to move expenses into 1983 to soften the potential tax burden. These influences may have altered farmers' traditional marketing patterns (table 12) and could influence the estimate of receipts for both 1983 and 1984.

Cash receipts for food grains declined 14 percent in 1983 when a 42-percent drop in rice receipts combined with a 10-percent decline in wheat receipts. Production of all wheat was 2.4 billion bushels in 1983, down 12 percent from 1982, and acres harvested fell 21 percent. The U.S. average yield per acre set a record of 39.4 bushels. Calendar year wheat prices averaged \$3.59, up from \$3.52 in 1982.

Rice receipts fell because of a sharp decline in marketings in the last quarter caused mostly by a 35 percent decline in production. Both harvested acreage and U.S. average yields dropped from 1982. The calendar year average price was down 1 percent from 1982.

Feed grain receipts for 1983 fell 8 percent when lower corn and sorghum receipts outweighed higher hay and barley receipts. For corn and sorghum, large first-half marketings from the record-large 1982 crop and heavy use of CCC loans combined to raise first-half receipts for these crops. However, strong second-half prices were offset by the decline in marketing volume from the small 1983 crop which reduced last-half receipts. Corn production fell 49 percent to 4.2 billion bushels when farm programs and drought reduced harvested acres to 51.4 million acres, down from 72.7 million acres in 1982. The drought cut the U.S. average yield to 81 bushels per acre, the lowest since 1974, compared with the record 113.2 bushels in 1982. The calendar year price averaged \$2.99, up 26 percent from 1982. Barley receipts rose 19 percent when second-half marketings and prices rose. Both the corn and sorghum PIK

Table 11—Crop and livestock prices and production, 1978-83P

Commodity (Unit)	1978	1979	1980	1981	1982	1983P	Percentage change— 1981-82 : 1982-83	
Production:							Percent	
Crops 1/								
Wheat (mil bu)	1,775.5	2,134.1	2,380.9	2,785.4	2,765.0	2,419.8	-0.7	-12.5
Rice (mil cwt)	133.2	131.9	146.2	182.7	153.6	99.7	-15.9	-35.1
Corn (mil bu)	7,267.9	7,928.1	6,639.4	8,118.7	8,235.1	4,166.1	1.4	-49.4
Oats (mil bu)	581.7	526.7	458.8	509.5	592.6	477.1	16.3	-19.5
Barley (mil bu)	454.8	383.2	361.1	473.5	515.9	508.3	9.0	-1.5
Sorghum (mil cwt)	731.3	807.4	579.3	875.8	835.1	479.2	-4.7	-42.6
Hay-all (mil tons)	143.8	147.3	130.7	142.5	149.2	140.7	4.7	-5.7
Soybeans (mil bu)	1,868.8	2,260.7	1,797.5	1,989.1	2,190.3	1,566.7	10.1	-28.5
Cotton (mil bales)	10.9	14.6	11.1	15.6	12.0	7.8	-23.5	-35.0
Tobacco (mil lbs)	2,024.8	1,526.5	1,786.2	2,063.6	1,994.5	1,428.5	-3.3	-28.4
Livestock products:								
Beef (mil lbs)	24,009	21,262	21,469	22,214	22,366	23,060	.7	3.1
Veal (mil lbs)	599	411	379	415	423	428	1.9	1.2
Pork (mil lbs)	13,209	15,270	16,432	15,716	14,121	15,117	-10.1	7.1
Broilers (mil lbs)	10,129	11,219	11,357	11,992	12,175	12,401	1.5	1.9
Turkeys (mil lbs)	2,098	2,344	2,425	2,576	2,505	2,633	-2.8	5.1
Eggs (mil doz)	5,608	5,777	5,806	5,822	5,799	5,656	-.4	-2.5
Milk (bil lbs)	121.5	123.4	128.5	133.0	135.8	140.0	2.1	3.1
Prices received by farmers:2/								
Crops:								
Wheat (dollars/bu)	2.82	3.51	3.88	3.88	3.52	3.59	-9.3	2.0
Rice (dollars/cwt)	9.29	9.05	11.07	11.94	8.36	8.31	-30.0	-.6
Corn (dollars/bu)	2.10	2.36	2.70	2.92	2.37	2.99	-18.8	26.2
Oats (dollars/bu)	1.15	1.30	1.54	1.92	1.69	1.54	-12.0	-8.9
Barley (dollars/bu)	1.93	2.16	2.49	2.73	2.28	2.32	-16.5	1.8
Sorghum (dollars/cwt)	3.43	3.91	4.67	4.72	4.00	4.89	-15.3	22.2
Hay-all (dollars/ton)	49.89	56.30	67.01	67.67	69.17	75.13	2.2	8.6
Soybeans (dollars/bu)	6.28	6.86	6.75	6.92	5.78	6.73	-16.5	16.4
Cotton (dollars/lb)	0.552	0.580	0.690	0.671	0.555	0.632	-17.3	13.9
Tobacco (dollars/lb)	1.25	1.31	1.39	1.65	1.73	1.67	4.8	-3.5
Vegetables (index) (1910-14=100)	522	548	562	677	631	650	-6.8	3.0
Fruit-all (index) (1910-14=100)	509	534	458	480	648	467	35.0	-27.9
Livestock and products:								
Cattle (dollars/cwt)	48.58	66.25	62.48	58.51	56.97	55.83	-2.6	-2.0
Calves (dollars/cwt)	58.43	89.73	77.48	64.46	60.18	62.13	-6.6	3.2
Hogs (dollars/cwt)	47.09	41.25	38.84	43.41	53.99	46.23	24.4	-14.4
Broilers (dollars/cwt)	26.40	26.09	27.92	27.97	26.83	29.24	-4.1	9.0
Turkeys (dollars/cwt)	42.02	41.88	40.03	38.46	37.53	36.48	-2.4	-2.8
Eggs (cents/doz)	52.78	58.14	56.65	62.19	58.49	63.03	-5.9	7.8
Milk (dollars/cwt)	10.58	12.03	13.05	13.76	13.59	13.57	-1.2	-.1

P = preliminary. 1/ Production in year produced. 2/ Calendar year simple averages.

Sources: "Field Crops", Stat. Bul. No. 708, and "Agricultural Prices, 1983 Summary," USDA, SRS.

Table 12—U.S. marketing distributions for selected crops, 1979-82 1/

Commodity	Crop year	Percentage of crop marketed in:	
		Calendar year produced	Following calendar year
		Percent	
Wheat	1979/80	71.4	28.6
	1980/81	73.1	26.9
	1981/82	70.1	29.9
	1982/83	68.9	31.1
Corn	1979/80	33.0	67.0
	1980/81	38.0	62.0
	1981/82	35.5	64.5
	1982/83	34.5	65.5
Sorghum	1979/80	59.8	40.2
	1980/81	69.0	31.0
	1981/82	60.5	39.5
	1982/83	63.9	33.1
Barley	1979/80	62.5	37.5
	1980/81	66.0	34.0
	1981/82	61.9	38.1
	1982/83	56.5	43.5
Soybeans	1979/80	45.4	54.6
	1980/81	51.9	48.1
	1981/82	47.2	52.8
	1982/83	45.8	54.2
Cotton	1979/80	63.6	36.4
	1980/81	60.5	39.5
	1981/82	56.9	43.1
	1982/83	57.1	42.9
Hay	1979/80	71.0	29.0
	1980/81	72.4	27.6
	1981/82	71.0	29.0
	1982/83	67.3	32.7

1/ Preliminary.

Source: Crop Production, USDA, SRS.



programs and the drought helped raise barley prices and receipts during the last half of the year.

Oil crop receipts in 1983 fell 5 percent from the \$14 billion of 1982. Soybean production fell 28 percent in 1983 to 1.57 billion bushels, mostly because of a 20-percent drop in average yield per acre. Cash receipts for soybeans fell 5 percent from the 1982 level as strong second-half prices were offset by reduced marketings from the short 1983 crop. Calendar year prices averaged \$6.73, up from \$5.78 in 1982.

Cotton receipts in 1983 dropped 13 percent from the 1982 level of \$4.9 billion. Cotton production fell 35 percent because drought reduced average yields 14 percent to 506 pounds per acre, and the drought and acreage programs cut harvested acreage 24 percent to 7.4 million acres. The drought also impaired the quality of a portion of the cotton crop. As a result, marketings were off substantially in the last half of 1983, accompanied by modest price increases, leading to reduced receipts. Substantial marketings of PIK cotton did not occur during the final quarter.

Cash receipts for vegetables in 1983 rose 2 percent from the \$8.1 billion of 1982. Receipts for potatoes and tomatoes accounted for about 33 percent of vegetable receipts, and receipts for both remained near their 1982 levels. Potato production declined 7 percent in 1983 when harvested acres fell 2 percent and average yield declined 5 percent. The summer drought of 1983 also cut dry bean production 39 percent to 15.5 million cwt and cut sweetpotato output 19 percent to 12.1 million cwt. The index of commercial vegetable prices rose 3 percent in 1983 after falling 7 percent in 1982.

Low prices and reduced second-half production were the main reasons for the 9-percent decline in cash receipts for fruits and nuts. Supplies of citrus fruits climbed above those of the freeze-damaged 1982 crop, but noncitrus utilized production fell about 4 percent. The apple crop, at 8.2 billion pounds, was 1 percent above the 1982 crop. Receipts for apples fell 5 percent because large competing supplies of fresh oranges contributed to sharply lower prices for fresh apples. Higher prices for processed apples, which account for almost half of total use, helped ease the downturn. The index of prices received for all fruit fell 28 percent in 1983, mostly because of large supplies of citrus fruits.

#### Government Payments

Government payments contributed significantly to 1983 gross farm income. Cash payments for deficiency, diversion, storage, and conservation programs totaled \$4.1 billion, helping to stabilize farm income and contributing to farm cash flow. PIK payments (valued at the loan rate for the individual crop loan) totaled \$5.2 billion in calendar year 1983, leaving total direct Government transfers at \$9.3 billion (table 13). Another \$4 to \$6 billion in 1983 PIK payments were disbursed during the first half of 1984, as some farmers took full advantage of the 5 months of storage assistance.

Table 13—Selected recoverable and nonrecoverable Government outlays to the farm sector, calendar years 1978-83 1/

Item	1978	1979	1980	1981	1982	1983P
Million dollars						
Nonrecoverable:						
Direct Government payments:						
Deficiency payments:						
Wheat	827.7	36.4	0.4	393.2	633.0	617.7
Rice	0	57.9	.1	*	155.8	259.9
Feed grains	304.2	289.5	64.5	45.4	528.7	460.9
Upland cotton	0	0	0	0	683.3	588.2
Subtotal	1,131.9	383.8	65.0	438.6	2,000.8	1,926.7
Diversion payments:						
Wheat	0	0	0	0	0	245.3
Rice	0	0	0	0	0	17.7
Feed grain	575.0	146.3	2.6	0.1	137.3	883.0
Upland cotton	36.7	3.6	0.1	*	1.7	2.0
Subtotal	611.7	149.9	2.7	.1	139.0	1,148.0
Disaster payments:						
Wheat	121.0	77.6	210.9	231.3	19.2	1.1
Rice	2.6	.8	1.8	1.7	.1	*
Feed grain	292.8	58.1	315.0	197.5	47.3	2.2
Cotton	90.0	181.4	171.6	222.0	115.3	72.0
Subtotal	506.4	317.9	699.3	652.5	181.9	75.3
Reserve storage payments:						
Wheat	99.3	59.1	24.0	125.7	273.7	266.3
Corn	183.6	137.4	120.3	107.1	521.6	174.4
Sorghum grain	19.0	12.4	3.2	32.9	93.2	45.0
Barley	9.9	5.5	-.6	2.8	18.5	21.0
Oats	8.1	5.9	-.1	-.1	.8	0.5
Unallocated 2/	0	5.6	13.6	41.1	0	48.0
Subtotal	319.9	225.9	160.4	309.5	907.8	555.2
Other programs 3/	460.1	338.8	358.3	531.4	262.5	347.5
Total	3,030.0	1,416.3	1,285.7	1,932.1	3,492.0	4,052.7
Value of PIK commodities 4/	0	0	0	0	0	5,241.5
Recoverable:						
Net CCC loan values 5/,6/						
Wheat	-324.3	-489.2	103.5	1,042.0	1,976.9	1,003.5
Rice	-25.8	18.2	-2.9	-6.9	439.4	-14.1
Corn	709.5	-419.4	478.3	149.5	3,758.4	-211.5
Sorghum, barley, oats	115.0	-160.0	-191.1	243.4	770.2	93.9
Soybeans	-39.0	130.8	32.2	448.5	1,060.9	-1,331.6
All cotton	-402.0	34.8	30.8	157.7	1,075.8	-288.8
Total	33.4	-884.9	450.8	2,034.2	9,081.6	-748.6
CCC dairy purchase costs 7/	296.0	1,008.0	1,519.1	2,182.0	2,562.3	2,611.4
Grand total 8/	3,359.4	1,539.4	3,255.6	6,148.3	15,135.9	11,157.0

P = preliminary. \* = Less than \$100,000. 1/ These are approximations and are not official CCC budget outlays. 2/ Includes PIK storage costs for 1983 and 1984. 3/ Includes wool price supports, various agricultural conservation programs, and other miscellaneous programs. 4/ PIK quantities valued at original loan rates. The stock variable is considered a flow for this analysis. 5/ Includes regular and reserve nonrecourse loans. 6/ Negatives denote net withdrawals from CCC. 7/ Estimated calendar year data and excludes proceeds from CCC sales and transfers. 8/ Excludes any other non-CCC aid.

Other Cash and  
Nonmoney Income

Besides cash receipts from the marketings of crop and livestock products, farmers also received other cash income from such farm-related sources as machine hire, customwork, and recreational income. Income from these sources in 1983 fell to about \$1.5 billion compared with \$2 billion in 1982. The decline was traced to lower income from machine hire and customwork because of drought-reduced yields and acreage-reduction programs.

The nonmoney income category of the farm income account represents the rental value of housing provided by farm dwellings and the value of farm products consumed directly in farm households. Including an estimate of nonmoney income in the farm income estimate is consistent with procedures used by the Department of Commerce to construct the National Income Accounts and allows a comparison of personal income of the farm and nonfarm population. The nonmoney imputations are excluded from the estimates of farmers' cash income and cash flow. The value of nonmoney income totaled \$13.6 billion in 1983, down from \$14.2 billion in 1982. Much of this decline was triggered by the reduced gross rental value of farm dwellings caused by the lower value of farm buildings in 1983.

Income  
Indicators

Although nominal cash receipts declined for the first time in 6 years in 1983, total cash income (including CCC loans) was just below the 1982 record-high because of direct Government payments (including PIK disbursements) and other cash income. Direct Government payments totaled about \$9.3 billion, which was \$5.8 billion more than in 1982, and other cash income totaled about \$1.5 billion from customwork, machine hire, and farm recreational activities.

Meanwhile, spurred by the drop of about 5 percent in total input use and a rise of less than 3 percent in the cost of input items, cash production expenses fell by \$3.9 billion.

Net cash income (including CCC loans) available to farmers for purchasing assets, loan retirement, and other expenditures likely totaled \$40.1 billion, surpassing the 1980 record by \$2.4 billion (table 14). Except for 1981, when the increase in cash sources of income failed to offset a \$5.8-billion increase in cash expenses, nominal net cash income available to farmers has increased each year since 1977.

Besides cash receipts from the sale of agricultural products, the farm production sector has cash sources from real estate and nonreal estate business loans, net changes in currency and demand deposits, and rental income from agricultural resources. A large share of the cash from loans may be used for input purchases or the purchase or repair of capital items, such as tractors, machinery, buildings, and improvements. Net cash flow is the sum of net cash income from farming, loans, and net rent, less expenditures for capital items, and is a measure of the change in cash available for business operations, real estate purchases, and household consumption.



Table 14—Farm income and cash flow statements, 1978-83

Item	:	1978	:	1979	:	1980r	:	1981r	:	1982r	:	1983
	:		:		:		:		:		:	
	:	Billion dollars										
Farm income sources:	:											
Cash receipts	:	112.9		131.8		140.5		142.6		144.8		138.7
Crops 1/	:	53.7		63.2		72.7		73.3		74.6		69.5
Livestock	:	59.2		68.6		67.8		69.2		70.1		69.2
Cash Government payments	:	3.0		1.4		1.3		1.9		3.5		4.1
Value of PIK commodities	:	0		0		0		0		0		5.2
Total direct payments	:	3.0		1.4		1.3		1.9		3.5		9.3
Other cash income 2/	:	1.2		1.6		1.5		1.9		2.0		1.5
Total cash income 3/	:	117.1		134.7		143.3		146.4		150.2		149.6
Nonmoney income 4/	:	9.2		10.7		12.4		13.6		14.2		13.6
Realized gross income	:	126.4		145.4		155.7		160.0		164.4		163.2
Value of inventory change	:	.8		4.9		-5.5		7.9		-2.6		-11.7
Total gross income	:	127.2		150.4		150.2		167.9		161.8		151.4
Production expenses:	:											
Cash expenses 5/, 6/	:	81.0		97.3		105.6		111.4		113.4		109.5
Total expenses	:	99.5		118.1		128.9		136.9		139.5		135.3
Income statement:	:											
Net cash income: 1/, 6/	:											
Nominal	:	36.1		37.4		37.7		35.0		36.8		40.1
Deflated (1972 dollars) 7/	:	24.0		22.9		21.1		17.9		17.8		18.6
Net farm income: 1/	:											
Nominal total net	:	27.7		32.3		21.2		31.0		22.3		16.1
Deflated net (1967 dollars) 8/	:	14.2		14.8		8.6		11.4		7.7		5.4
Deflated net (1972 dollars) 7/	:	18.4		19.7		11.9		15.9		10.8		7.5
Off-farm income	:	29.7		35.2		37.6		39.8		39.4		41.0
Other sources and uses of funds:	:											
Change in loans outstanding 5/	:	15.8		23.9		15.1		15.5		6.8		2.9
Real estate	:	7.6		13.0		9.4		9.3		3.7		2.1
Nonreal estate 9/	:	8.3		10.9		5.9		6.2		3.1		0.8
Rental income	:	4.6		5.6		5.6		5.7		5.6		4.3
Gross cash flow	:	56.6		66.8		58.4		56.1		49.3		47.3
Capital expenditures 6/	:	17.9		19.9		18.0		16.8		13.6		13.1
Net cash flow 1/,5/	:	38.7		47.0		40.5		39.3		35.6		34.2

R = revised. 1/ Includes net CCC loans. 2/ Income from customwork, machine hire, and farm recreational activities. 3/ Total cash receipts plus direct Government payments and other cash farm income. 4/ Value of home consumption of farm products and imputed rental value of farm dwellings. 5/ Excludes perquisites to hired labor and depreciation. 6/ Excludes farm households. 7/ Deflated by the GNP implicit price deflator. 8/ Deflated by the CPI-U. 9/ Excludes CCC loans.

Gross cash flow in 1983 fell about 4 percent from the \$49.3 billion of 1982. The sources of gross cash flow also changed considerably, with cash income from farming and rentals accounting for more than 94 percent of the total. Changes in loans outstanding fell 57 percent from the \$6.8-billion level of 1982 and were only 16 percent of the \$18-billion average level borrowed during 1979, 1980, and 1981. Although capital expenditures (excluding dwellings) declined 4 percent from the \$13.6 billion of 1982, net cash flow still fell about 4 percent to \$34.2 billion--the fourth consecutive annual decline.

Traditional net farm income accounts include income from production as well as income and expense imputations for the rental value of farm dwellings, the value of home consumption, depreciation, and inventory changes. Net farm income measures the net value of production in a calendar year, and has been much more volatile in recent years than net cash income. This may be traced to dramatic swings in the weather and the attendant large swings in inventory adjustments in recent years.

Inventory adjustment figured prominently in determining the level of 1983 net farm income. The large 1981 and 1982 crops and resulting large carryover were followed by the 1983 drought-reduced crop and subsequent inventory drawdown. Before the 1983 summer drought, the inventory adjustment was expected to range from minus \$1 billion to \$4 billion; the final estimate for 1983 inventory adjustment stands at minus \$11.7 billion. This record large decline in the inventory adjustment reflected the selling of inventories by farmers as they attempted to maintain their receipts.

#### Income Variability

The farm sector has become more diverse over the years, so aggregate indicators are less useful for describing the economic conditions for any particular group of farmers. Income measures are highly variable depending upon commodity produced, region, farm size, debt structure, and off-farm income opportunities.

In 1983 the drought created wide variations in the incomes of individual farmers. In drought areas, particularly those of the Southern Plains, Midwest, and Southeast, farmers who chose not to participate in the commodity programs or buy insurance probably had low returns from production. Though crop prices were higher, these farmers likely had little to sell. Thus, despite decreased production expenses, the receipts of many farmers in drought areas probably did not cover cash expenses, leaving many farm families in a difficult financial situation. Meanwhile, some farmers had good yields, especially in the Pacific region. For these operators, crops were large and prices high, meaning cash incomes at a possible alltime high.

Total income per farm from all sources depends substantially on off-farm sources of income. Off-farm income, which includes nonfarm wages and salaries, pensions, and interest





In 1983 nominal income per farm from all sources was estimated at \$24,090, down from \$25,731 in 1982. In 1972 dollars, total income per farm in 1983 totaled \$11,172, about 10 percent less than the year before.

Income  
Distributions  
by Type of  
Farm

As farms have become more specialized, the need for understanding how changes in income or expense items may affect the level and distribution of income by type of farm has become more crucial. Distributing income and expense items by type of farm facilitates analyses which examine how changes in particular expense items, crop or livestock production practices, prices paid or received, or Government programs may affect the costs and returns of different farms based on commodities produced. The Standard Industrial Classification (SIC) Code provides one means of analyzing specific farm types. The SIC shows the degree of agricultural production specialization. For a farm to be classified as a particular type, it must have sales of a particular product or group of products equal to 50 percent or more of the total value of all farm products sold during the year. The 1978 Census of Agriculture published data for 13 types of farms including: cash grain; cotton; tobacco; other field crops; fruit and tree nut; vegetable and melon; horticultural specialty; general crop; beef cattle, hog, and sheep (including ranches and feedlots); dairy; poultry and egg; animal specialty; and general livestock.

Cash grain farms include wheat, rice, corn, soybeans, sorghum for grain, barley, oats, buckwheat, flaxseed, rye, dry field beans, dry field peas, and other cash grains. Other field crops farms grow sugar beets, sugarcane, Irish potatoes, sweetpotatoes, peanuts, hops, mint, broomcorn, hay, and flax. Horticultural specialty establishments primarily produce ornamental plants and nursery products, such as fruit stocks, vegetable seeds and plants, sod, flowers, and shrubbery. General crop farms are establishments deriving 50 percent or more of their total value of sales from agricultural crops but less than 50 percent from any particular crop group.

Poultry and egg establishments include the production of chickens (broilers, fryers, and roasters) and turkeys for slaughter, chicken eggs (including table eggs and hatching eggs and the sale of cull hens), turkey eggs, and poultry hatcheries. Animal specialties include farms primarily producing fur and fur-bearing animals and rabbits. General livestock farms derive 50 percent or more of their total value of sales from livestock and livestock products but less than 50 percent from any particular livestock group.

To calculate an estimate of farm income by type of farm, gross cash farm income before inventory adjustment and cash production expenses were directly allocated to the various types of farms using 1978 Census of Agriculture data supplemented by 1979 Census of Farm finance data and 1978 Internal Revenue Service farm data. The procedure used to estimate net cash farm income by SIC focused on distributing

each published USDA income and expense series according to the percentage distribution of published 1978 Census of Agriculture, 1979 Census of Farm Finance, and 1978 IRS farm data. Net cash farm income was estimated for each SIC category by subtracting cash production expenses from gross cash farm income. USDA distributed numbers of farms are based on 1978 Census of Agriculture data.

There are three exceptions to the use of the 1978 allocation procedures and benchmark distributions: PIK payments for corn, rice, wheat, and grain sorghum were distributed according to cash grain receipts; PIK payments for cotton were distributed according to cotton cash receipts; and dairy deductions were distributed as an expense using dairy cash receipts. The 1982 and 1983 estimates thus were based on the assumption that no significant shifts existed in the number of farms and farm income by SIC between 1978 and 1982 and 1983.

The assumption is, of course, not valid to the extent that SIC farm shifts occurred. The assumption of stability among the major types of commodities produced and sold on various types of farms likely has little effect on major farm types such as cotton or dairy, but could be questionable for cash grain and livestock farms whose sales may vary from year to year.

The reliability of the 1983 estimates could be affected more by the PIK program and drought than a shift in farm types. The PIK program in 1983 probably reduced the expenses of cash grain and cotton farms more than all other types of farms. By using 1978 benchmark data to distribute 1982 and 1983 expenses for all farm types, the PIK-related cost reduction is distributed to all farm types. Thus the reduction in production expenses of cash grain and cotton farms is probably slightly understated, and the reduction in production expenses of all other farm types is probably overstated.

Although the reliability of the 1982 and 1983 SIC farm income estimates may not be as high as the 1978 benchmark estimates, the estimates can help improve understanding of economic factors which affect income and financial conditions of crop and livestock farms.

#### Cash Grain Farms

Cash income per farm is estimated to have totaled \$22,276 in 1983, an increase of 34 percent from 1982. The PIK program greatly affected the estimated income of cash grain farms. The estimated in-kind payment of \$6,528 per farm accompanied by the PIK-related reduction in production costs of about \$4,051 per farm equaled 187 percent of the \$5,668 increase in cash farm income per cash grain farm from 1982 to 1983 (table 16). Cash receipts earned from grain sold dropped \$3 billion or \$5,304 per farm.

Table 16—Farm sector SIC net farm income before inventory adjustment and cash farm income, crop farms, 1983P

Item	Total, all farms	Total, crop farms	Cash grain	Cotton	Tobacco	Other field crops	Vegetables and melon	Fruit and tree nut	Horti- culture specialty	General crop
Thousands										
Farms	2,370	1,087	568	31	136	132	34	86	31	69
Million dollars										
Crop cash receipts:										
Grain	37,446	31,954	29,077	594	316	691	203	47	17	1,009
Cotton and cottonseed	4,283	4,181	407	3,266	3	39	89	29	3	345
Tobacco	2,831	2,543	88	1	2,263	12	3	1	1	174
Field seeds, hay, forage, and silage	2,207	1,619	322	72	14	900	32	13	6	260
Vegetables, sweet corn, and melons	6,183	6,052	182	61	17	107	5,085	105	27	468
Fruits, nuts, and berries	6,153	6,072	27	22	1	21	84	5,782	11	124
Nursery and green- house products	4,479	4,466	9	1	0	5	23	13	4,383	32
Other crops	5,934	5,679	398	54	64	4,287	166	24	6	680
Subtotal, crop receipts	69,516	62,566	30,510	4,071	2,678	6,062	5,685	6,014	4,454	3,092
Livestock cash receipts:										
Poultry and products	9,960	63	30	0	2	2	2	6	1	20
Dairy products	18,808	288	176	3	15	12	5	4	1	72
Cattle and calves	28,694	2,340	1,539	73	110	157	26	41	6	388
Hogs and pigs	9,714	1,320	1,035	8	57	44	7	4	1	164
Sheep, lambs, and wool	418	39	24	2	0	6	0	1	0	6
Other livestock	1,609	54	22	3	3	11	1	4	1	9
Subtotal, livestock receipts	69,203	4,104	2,826	89	187	232	41	60	10	659
Direct Government payments	4,053	3,476	2,638	557	28	68	32	8	2	143
Cash grain and other	3,307	2,822	2,568	52	28	61	18	4	2	89
Cotton	662	646	64	505	0	6	14	4	0	53
Wool	84	8	6	0	0	1	0	0	0	1
Value of PIK commodities	5,242	4,537	3,708	478	40	92	37	10	2	170
Value of PIK grain crops	4,713	4,020	3,657	75	40	87	26	6	2	127
Value of PIK cotton	529	517	51	403	0	5	11	4	0	43
Total cash receipts	148,014	74,683	39,682	5,195	2,933	6,454	5,795	6,092	4,468	4,064
Nonmoney and other income:										
Machine hire and customwork	1,376	900	527	61	26	85	35	80	18	68
Recreational services	164	43	16	0	2	11	1	1	7	5
Imputed net rental value of operators dwellings	6,343	2,778	1,356	68	234	382	115	355	91	177
Home consumption	958	414	216	10	52	52	13	31	11	29
Subtotal, nonmoney and other income	8,841	4,135	2,115	139	314	530	164	467	127	279
Other cash income	1,540	943	543	61	28	96	36	81	25	73
Total cash income	149,554	75,626	40,225	5,256	2,961	6,550	5,831	6,173	4,493	4,137
Gross farm income	156,855	78,818	41,797	5,334	3,247	6,984	5,959	6,559	4,595	4,343
Total cash expenses	109,484	49,853	27,572	3,303	2,064	4,520	2,734	4,331	2,402	2,927
Total expenses	129,010	60,880	34,471	3,931	2,592	5,653	3,163	5,118	2,672	3,280
Net cash income 1/	40,070	25,773	12,653	1,953	897	2,030	3,097	1,842	2,091	1,210
Net farm income before inventory adjustment, total: 2/	27,845	17,938	7,326	1,403	655	1,331	2,796	1,441	1,923	1,063
Returns to operators	20,900	14,840	5,783	1,321	406	910	2,674	1,053	1,829	864
Net rent to operator landlords	602	320	187	14	15	39	7	33	3	22
Imputed net rental value of operator dwellings	6,343	2,778	1,356	68	234	382	115	355	91	177
Income per farm:										
Net cash income	16,907	23,710	22,276	63,000	6,596	15,379	91,088	21,419	67,452	17,536
Net farm income before inventory adjustment	11,749	16,502	12,898	45,258	4,816	10,083	82,235	16,756	62,032	15,406

1/ Total cash income less total cash expenses.

2/ Gross farm income plus net rent to operator landlords less total expenses. Includes cash and noncash income and expenses.



Cash farm production expenses likely declined 8 percent (table 17). Input use fell in 1983 following substantially reduced planted and harvested acreages. The \$800-million decline in energy, fertilizer, and chemical costs accounted for 35 percent of the \$2-billion drop in cash production expenses.

Cotton  
Farms

Cash farm income per cotton farm increased 4 percent in 1983. Cash income would have declined substantially without PIK. The PIK payment in 1983 amounted to \$15,419 per farm, or 24 percent of the \$63,000 cash farm income per farm. The PIK-induced reduction in production expenses equaled \$8,742 per farm, or 14 percent of the 1983 cash farm income per farm. If PIK payments were not included and production expenses not reduced, 1983 cash farm income per cotton farm would have been \$38,839 (assuming no change in all other factors), or 62 percent of the cash farm income of \$63,000 per cotton farm including PIK payments. Cotton cash receipts excluding PIK declined \$508 million in 1983, or \$16,387 per farm. Cash production expenses declined \$271 million. Fertilizer, chemical, labor, energy, and customwork expenses declined \$154 million.

Tobacco  
Farms

Cash farm income likely declined 22 percent per farm in 1983 to \$6,595. Cash farm income per farm in 1983 was 18 percent below 1978. Tobacco cash receipts probably declined 15 percent because of a 4-percent increase in prices received and a 28-percent drop in production. Cash expenses declined \$128 million, but gross cash farm income dropped \$414 million.

Vegetable and  
Melon Farms

Cash farm income per vegetable and melon farm, at \$91,088, was the highest of any other SIC crop or livestock farm type. Cash farm income increased 11 percent from 1982 as cash expenses declined 6 percent and cash income increased 2 percent. Declining costs included labor, about \$35 million; energy and petroleum products, \$11 million; agricultural chemicals, \$8 million; and fertilizer, \$43 million. The drop in these four inputs constituted 54 percent of the \$180-million decrease in cash farm production expenses.

Fruit and  
Tree Nut Farms

Cash farm income amounted to \$21,418 per farm in 1983; off-farm income, \$28,984; and total income, \$50,312. Cash farm income declined an estimated 14 percent from 1982 and 29 percent from 1978. Fruit prices dropped 27 percent in 1983 causing a 9-percent decline in fruit and nut cash receipts. The decline in cash receipts was partially offset by a 5-percent decline in cash production expenses. Hired labor and contract labor were the largest production expenses, totaling 40 percent of cash production costs in 1983.

Horticulture  
Specialty Farms

Horticulture specialty farms averaged \$67,451 in cash farm income per farm in 1983, up 20 percent from the previous year. The increase in cash farm income in 1983 revolved around an estimated 3-percent increase in total cash income and a 5-percent drop in cash production expenses. Hired and contract

Table 17—Farm sector SIC farm expenses excluding households, crop farms, 1983P

Item	Total, all farms	Total, crop farms	Cash grain	Cotton	Tobacco	Other field crops	Vegetables and melon	Fruit and tree nuts	Horti- culture specialty	General crop
Million dollars										
Directly prorated expenses:										
Livestock and										
poultry purchased	8,792	555	381	14	18	42	6	7	1	86
Feed	18,963	877	574	22	50	65	13	21	5	127
Seeds	3,468	2,577	1,471	133	57	231	128	62	361	134
Fertilizer	7,115	4,881	3,145	264	220	459	232	204	56	301
Agricultural chemicals including lime	3,827	2,929	1,584	331	85	233	196	283	42	175
Energy and petroleum products	9,919	5,722	3,123	498	330	533	223	332	329	354
Hired farm labor 1/	10,258	6,719	1,523	498	343	669	875	1,298	1,118	395
Contract labor	1,189	1,005	85	69	25	81	206	446	34	59
Customwork	2,146	1,451	747	150	43	145	65	175	18	108
Subtotal, directly prorated expenses	65,677	26,716	12,633	1,979	1,171	2,458	1,944	2,828	1,964	1,739
Indirectly prorated expenses:										
Property taxes 2/	4,260	2,317	1,540	111	90	196	64	156	34	126
Depreciation 2/	19,501	11,046	7,118	624	526	1,118	389	718	204	349
Interest paid on-										
Real estate debt 2/	10,001	5,299	3,266	256	189	509	142	487	121	329
Nonreal estate debt	10,367	5,109	3,258	340	154	476	154	291	114	322
Repairs 2/	7,877	4,433	2,874	243	204	432	206	295	65	114
Rent	3,684	2,629	1,909	165	115	155	87	60	17	121
Subtotal, indirectly prorated expenses	55,690	30,833	19,965	1,739	1,278	2,886	1,042	2,007	555	1,361
Other expenses	7,643	3,331	1,873	213	143	309	177	283	153	180
Dairy deductions	640	10	7	0	1	0	0	0	0	2
Other	7,003	3,321	1,866	213	142	309	177	283	153	178
Total expenses	129,010	60,880	34,471	3,931	2,592	5,653	3,163	5,118	2,672	3,280

1/ Excludes rental value of laborer's dwellings. 2/ Excludes households.

labor, the largest single cost, declined \$38 million, or 28 percent of the \$137-million decrease in cash farm production expenses.

General Crop  
Farms

Cash farm income per farm increased 20 percent to an estimated \$17,536 for general crop farmers in 1983. An estimated 7-percent decline in cash farm production expenses offset a slight decline in gross cash farm income. Declines in fertilizer, energy, and agricultural chemicals were largely responsible for the \$219-million decline in cash farm production expenses.

Cattle, Hog,  
and Sheep Farms

Cash farm income of cattle, hog, and sheep farmers decreased 12 percent to \$3,561 per farm in 1983 (table 18). Cash farm income per farm in 1983 reached only 21 percent of the U.S. all-crop and livestock farm average. However, increases in off-farm income partially offset declines in cash farm income. Total cash income in 1983 likely reached 107 percent of 1978 and 66 percent of the U.S. all-crop and livestock farm average.

Dairy Farms

Cash farm income of dairy farms is estimated to have remained almost constant in 1983. Cash farm income per farm in 1982 and 1983 was 38 percent above 1978. Cash receipts likely increased 3 percent in 1983 because of a 3-percent increase in production. Prices received for dairy products matched 1982's.

Cash farm income per dairy farms averaged \$47,838 in 1983, ranking first for all SIC livestock farm categories and behind only cotton (\$63,000), vegetable and melon (\$91,088), and horticulture specialty (\$67,451) farmers. Operating a dairy farm is time-consuming, offering limited opportunity for off-farm work, so not surprisingly, the off-farm income average of \$7,622 per dairy farm is the lowest of any other SIC farm and amounted to only 44 percent of the U.S. average.

Milk marketing charges equaled \$3,652 per dairy farm and accounted for 5 percent of cash production expenses (table 19). Feed expenses, which accounted for 31 percent of cash farm production expenses in 1983, increased \$417 million, or \$2,590 per farm. An estimated \$492-million increase in dairy cash receipts helped to offset the \$546-million cash production expense increase caused by milk marketing deductions and feed purchases.

Poultry and  
Egg Farms

Cash farm income per poultry and egg farm totaled \$40,775 in 1983, down about \$1,525 from 1982 and up \$1,355 from 1978. Cash receipts from poultry and poultry products increased about 4 percent in 1983. Broiler receipts jumped 8 percent, boosted by increased production and prices received. Cash farm income of poultry and egg producers rose \$401 million in 1983, but cash farm production expenses likely increased \$518 million. Feed expenditures accounted for 67 percent of cash production expenditures of poultry and egg producers in 1983. The increase in total farm production spending grew out of rising feed expenditures. Prices paid for feed increased 10 percent.



Table 18—Farm sector SIC farm income before inventory adjustment, livestock farms, 1983

Item	Total, all farms	Total, livestock farms	Cattle, hog, and sheep	Dairy	Poultry and egg	Animal specialty	General livestock
Farms	2,370	1,283	992	161	49	47	34
Crop cash receipts:							
Grain	37,446	5,492	4,291	624	172	10	395
Cotton and cottonseed	4,283	102	73	20	5	1	3
Tobacco	2,831	288	163	69	24	4	28
Field seeds, hay, forage, and silage	2,207	588	390	138	13	4	43
Vegetables, sweet corn, and melons	6,183	131	62	37	17	1	14
Fruits, nuts, and berries	6,153	81	41	19	16	1	4
Nursery and green- house products	4,479	13	6	1	4	1	1
Other crops	5,934	255	200	23	16	0	16
Subtotal, crop receipts	69,516	6,950	5,226	931	267	22	504
Livestock cash receipts:							
Poultry and products	9,960	9,897	78	22	9,732	1	64
Dairy products	18,808	18,520	484	17,267	62	2	705
Cattle and calves	28,694	26,354	24,695	1,263	131	19	246
Hogs and pigs	9,714	8,394	7,973	184	87	1	149
Sheep, lambs, and wool	418	379	373	3	1	0	2
Other livestock	1,609	1,555	147	9	4	1,375	20
Subtotal, livestock receipts	69,203	65,099	33,750	18,748	10,017	1,398	1,186
Direct Government payments	4,053	577	465	59	16	1	36
Cash grain and other	3,307	485	379	55	15	1	35
Cotton	662	16	11	3	1	0	1
Wool	84	76	75	1	0	0	0
Value of FIK commodities	5,242	705	550	81	23	1	50
Value of FIK grain crops	4,713	693	541	79	22	1	50
Value of FIK cotton	529	12	9	2	1	0	0
Total cash receipts	148,014	73,331	39,991	19,819	10,323	1,422	1,776
Nonmoney and other income:							
Machine hire and customwork	1,376	476	354	66	18	21	17
Recreational services	164	121	59	44	3	14	1
Imputed net rental value of operators dwellings	6,343	3,565	2,609	503	152	198	103
Home consumption	958	544	409	77	22	21	15
Subtotal, nonmoney and other income	8,841	4,706	3,431	690	195	254	136
Other cash income	1,540	597	413	110	21	35	18
Total cash income	149,554	73,928	40,404	19,929	10,344	1,457	1,794
Gross farm income	156,855	78,037	43,422	20,509	10,518	1,676	1,912
Total cash expenses	109,484	59,631	36,871	12,227	8,346	927	1,260
Total expenses	129,010	68,130	41,886	14,486	8,862	1,220	1,676
Net cash income 1/ inventory adjustment, total: 2/	40,070	14,297	3,533	7,702	1,998	530	534
Returns to operators	27,845	9,907	1,536	6,023	1,656	456	236
Net rent to operator landlords	20,900	6,060	-1,301	5,510	1,495	227	129
Imputed net rental value of operator dwellings	602	282	228	10	9	31	4
Income per farm:							
Net cash income	6,343	3,565	2,609	503	152	198	103
Net farm income before inventory adjustment	16,907	11,143	3,561	47,839	40,776	11,277	15,706
	11,749	7,722	1,548	37,410	33,796	9,702	6,941

1/ Total cash income less total cash expenses. 2/ Gross farm income plus net rent to operator landlords less total expenses. Includes cash and noncash income and expenses.

Table 19 —Farm sector SIC farm expenses excluding households, livestock farms, 1983

[illegible]

1/ Excludes rental value of laborer's dwellings. 2/ Excludes households.

## **Animal Specialty Farms**

Cash income per animal specialty farm likely increased 56 percent in 1983. Total cash income of animal specialty farms increased about \$178 million, and their cash production expenses declined \$5 million. Cash farm income equaled \$11,276 per farm.

## **General Livestock Farms**

Cash farm income per general livestock farm likely increased 6 percent in 1983. Dairy cash receipts accounted for 40 percent of the total cash receipts of general crop farmers in 1983. Other contributors to cash receipts were grain, 25 percent; cattle and calves, 15 percent; and hogs and pigs, 9 percent. The estimated net cash farm income of \$15,705 per general livestock farm posted about 93 percent of the U.S. average for all farms.

## **In Summary**

The PIK program substantially improved the farm income position of cash grain and cotton farms in 1983. The PIK-induced decrease of production expenses was almost as important as the in-kind payment received by farmers, giving the PIK program a double boost in increasing farm income. The PIK-related reduction in costs of about \$4,051 per cash grain farm was 62 percent of the estimated \$6,528 in-kind payment received per cash grain farm. The estimated reduction in production expenses of \$8,742 per cotton farm was 57 percent of the \$15,419 in-kind payment received per cotton farm. Because of the cost reduction impact, the boost in farm income was much more than the value of the commodities received in-kind. Dairy farm income remained almost constant from 1982 to 1983 because of a 3-percent increase in cash receipts. Milk deductions of about \$3,652 per dairy farm exceeded the estimated \$2,590 feed expense increase per dairy farm. Feed expenses increased about \$925 per cattle, hog, and sheep farm which contributed to the \$473 decline in net cash farm income per farm.

## **Farm Equity**

Farm equity excluding farm households declined to \$733 billion on January 1, 1984, a decrease in nominal terms of about 1 percent (table 20). Total assets in 1983 declined 1 percent, and total liabilities including CCC loans declined 1 percent. The resulting debt-to-asset ratio of 21.5 percent shows that many farmers will have difficulty obtaining loans in 1984.

Real estate, the major portion of total asset value, dropped to \$704 billion on January 1, 1984, a decrease of about 1 percent, the third consecutive year of falling farm real estate values. The expected 2-percent increase in real estate debt was likely well below the recent annual average of 17 percent between 1976 and 1982. Nonreal estate debt, excluding CCC loans, may have increased 4 percent during 1983. CCC loans showed the largest percentage decrease because of PIK loan redemptions and the opening of the farmer-owned reserves for corn and sorghum.

## **Balance Sheet**

The nominal equity position of the farm sector (excluding households) likely declined 1 percent from January 1, 1983, to January 1, 1984, to \$733 billion, repeating the declines



Table 20—Balance sheet of the farming sector (excluding farm households), 1980–84

Item	: 1980	: 1981	: 1982	: 1983 1/	: 1984 2/	: Percent change, 1983–84
<hr/>						
	Billion dollars					Percent
Assets						
Physical assets:						
Real estate	695.1	762.5	753.6	707.9	703.7	-.6
Nonreal estate—						
Livestock and poultry	61.4	60.8	53.6	52.9	51.3	-3.0
Machinery and motor vehicles	90.8	96.8	103.0	105.8	109.0	3.0
Crops stored on and off farms	33.5	35.9	36.3	42.1	37.0	-12.1
Financial assets:						
Demand deposits and currency	7.3	7.4	7.6	7.8	8.2	4.5
Investments in cooperatives	20.8	22.8	24.6	26.8	25.2	-5.0
Total assets	909.0	986.1	978.6	943.3	934.4	-.9
Claims						
Liabilities:						
Real estate debt	78.4	87.7	97.0	100.8	102.9	2.1
Nonreal estate debt—						
Excluding CCC loans	71.5	77.3	83.5	86.6	88.0	1.6
CCC loans	5.1	5.0	8.0	15.4	10.4	-32.5
Total liabilities	154.9	170.0	188.5	202.8	201.3	-1.0
Proprietors' equity	754.1	816.1	790.1	740.5	733.1	-1.0
Total claims	909.0	986.1	978.6	943.3	934.4	-.9
<hr/>						
	Percent					
Debt-to-asset ratio	17.0	17.2	19.3	21.5	21.5	0

1/ Preliminary. 2/ Forecast.

of the previous 2 years. In real terms, the farm sector's equity fell slightly, the fourth consecutive decline since January 1, 1980. Total farm assets, excluding the assets of farm households, declined about 1 percent, and total liabilities, including CCC loans, increased 1 percent. Total farm debt last failed to rise in 1946. Because of these offsetting movements, the debt-asset ratio did not rise during 1983.

Real Estate  
Assets

Farm program acreage reductions and weather-reduced yields combined to raise both current and prospective prices for crops. Reduced production expenses, higher Government payments, and stronger crop prices combined to send net cash income to a record \$39.8 billion in 1983. Nominal interest rates were also lower in the first half of 1983. More farmers likely qualified for loans in 1983 because of lower nominal interest rates and expectations for improvement in cash income from farming. However, high real interest rates, drought in major crop producing regions, and the lower value of farm exports in 1983 caused farm real estate values to drop.

Nonreal Estate  
Assets

Nonreal estate assets likely declined 2 percent on January 1, 1984, from the \$201 billion of the previous year. The value of machinery and vehicles increased 3 percent. The large reduction in crop production caused by the drought offset increased prices, leaving the value of crop inventories about \$5 billion below the \$42.1 billion of January 1, 1983. Financial assets (demand deposits, cash on hand, and investments in cooperatives) likely rose 3 percent from \$34.6 billion on January 1, 1983.

Total Farm Debt

Total farm debt on January 1, 1984, declined 1 percent from the year-earlier total of \$202.8 billion. Debt secured by farm real estate rose about 2.1 percent during 1983; nonreal estate debt excluding CCC loans rose about 1.6 percent.

Factors underlying the slowdown in debt increases included: reduced input purchases because of the acreage-reduction programs, continued slow machinery sales, and large PIK-related CCC loan redemptions.

The \$5-billion decline in CCC debt in 1983 grew out of fewer new loans (caused by stronger crop prices) and the large loan redemptions of the PIK program. Some corn and sorghum was redeemed normally from the farmer-owned reserve because the 5-day average price reached the release price of reserve VI (1981 crop loans) for both corn and sorghum and of reserve V (1982 crop loans) for corn, making it possible for a few farmers to repay their loans on grain not committed to PIK.

Farm Income Level  
and Distribution

To facilitate the development of income distributions, data are collected through annual surveys and are available about 6 months after the end of the year. For this reason, it is useful to consider 1982 income levels to understand the distribution of income among different farm sizes.

Significant reductions in inflation and interest rates provided some relief to farmers during 1982. Conditions varied widely depending on commodity produced, geographic region, and individual farm cost structure, and many farmers continued to have some cash flow problems. However, CCC loans and direct Government payments helped stabilize cash flow and net income within the sector in 1982. Net CCC loans added \$9.1 billion to cash flow within the sector compared with \$2.0 billion in 1981, and direct payments added \$3.5 billion compared with \$1.9 billion in 1981. Net cash income excluding CCC loans fell 14 percent to \$27.9 billion in 1982, but increased 5 percent to \$36.8 billion when net CCC loans were considered as crop receipts.

#### Cash Receipts

Total cash receipts from 1982 farm marketings reached an estimated \$144.8 billion, up 1.5 percent from the revised 1981 receipts. In constant (1972) dollars, receipts fell 4.2 percent. Nominal receipts rose 1.7 percent for crops and 1.3 percent for livestock and products.

#### Other Cash and Nonmoney Income

Farm income from sources other than marketings (direct Government payments, other cash income, and nonmoney income) increased 13 percent in 1982 to \$19.6 billion. Direct Government payments totaled about \$3.5 billion, up \$1.6 billion from 1981. Reserve storage payments of \$907 million were the largest single payment item in 1982 followed by the cotton programs at \$800 million (\$683 million was price deficiency), feed grains at \$713 million (\$529 million was price deficiency), and wheat at \$652 million (\$632 million was price deficiency). One-third of total Government payments went to three States and over 50 percent went to six States. Texas received 18 percent of total cash payments (58 percent of this was for cotton) followed by Kansas and Nebraska with 8 percent each.

Other cash income of \$2 billion included income from farm recreational activities (\$156 million) and machine hire and customwork. Nonmoney income of \$14.2 billion consisted of \$13.1 billion for the imputed rental value of farm dwellings and \$1.0 billion for the value of farm products consumed directly on the farm.

#### Value of Inventory Change

The value of inventory change for crops is essentially a residual derived by deducting the quantities sold and fed from production multiplied by the calendar year average price. For livestock, the change is the number of animals throughout the year multiplied by the average value per head. Inventory change was estimated at minus \$2.6 billion for 1982 compared with \$7.9 billion in 1981 and minus \$5.5 billion in 1980.

#### Income Indicators

Total production expenses, excluding expenses associated with farm households, increased 1.9 percent in 1982. Expenses tied to the household were real estate interest charges, real estate taxes, repair on dwellings, depreciation on dwellings, and insurance. Production expenses, excluding those associated with farm households, are used to calculate the returns to operator series.



The largest share of most expenses falls into one of two sales classes, the category of farms with sales of \$500,000 and over and the category of farms with sales of \$40,000 to \$99,999 (table 21). Between these two classes are the \$200,000 to \$499,999 and \$100,000 to \$199,999 sales classes. The next largest share of most expense items falls into either of these classes.

About 55 percent of livestock purchases and 40 percent of feed purchases were made by farms with sales of \$500,000 and over (table 21). Several smaller livestock-related expenses, such as veterinarian fees, grazing fees, and livestock marketing charges, also appeared in this sales class. The next sales class, \$200,000 to \$499,999, accounted for another 16 to 20 percent share of each of these five livestock expenses.

The largest share of several major crop expenses, such as seed purchases, fertilizer and lime, pesticides, and customwork, fell into the category of farms with sales of \$40,000 to \$99,999. This class accounted for about 22 to 25 percent of these crop expenses. The category of farms with sales of \$100,000 to \$199,999 absorbed 17 to 23 percent of these crop-related expenses.

Between 43 and 49 percent of machinery and building expenses, such as depreciation, repair and maintenance charges, personal property taxes, and insurance occurred on farms with sales of \$40,000 to \$199,999. About 45 percent of real estate taxes, real estate interest, and short-term interest was found in this sales grouping as well. One other major expense, net rent to nonoperator landlords, also had 48 percent of its total expense in this sales group.

The energy expense items were petroleum and electricity. Nearly 46 percent of petroleum expenses fell into the \$40,000 to \$199,999 group, and electricity expenses were more evenly distributed over the top four sales classes with the largest share falling into the largest class.

Wages to hired labor and contract labor follow the distributional trend of the livestock expenses; 63 percent of each labor cost characterized the two highest sales classes combined. Nearly 20 percent of customwork came under the \$500,000 and over class compared with 22 percent in the \$40,000 to \$99,999 class.

The five classes consisting of sales from \$1,000 to \$39,999 accounted for 30 percent of building expenses and 7 percent of livestock purchases. Nearly half of the expenses in this combined sales class group was in the \$20,000 to \$39,999 class.

The smallest sales class of \$1,000 to \$2,499 accounted for the largest share of household expenses (20 percent). Eighteen percent of household expenses fell into the \$40,000

Table 21—Percentage distribution of number of farms, production expenses, and net farm income before inventory adjustment, by value of sales class, 1982

Item	: \$500,000 : and : over	: \$200,000 : to : \$499,999	: \$100,000 : to : \$199,999	: \$40,000 : to : \$99,999	: Less : than : \$40,000	: All : farms
	Percent					
Number of farms	1.0	3.6	7.7	16.4	71.3	100.0
Farm origin:						
Feed	39.6	20.2	17.6	13.8	8.8	100.0
Livestock	55.3	16.3	12.3	9.3	6.8	100.0
Seed	16.0	19.7	22.3	24.5	17.5	100.0
Manufactured inputs:						
Fertilizer	13.3	19.1	23.3	25.4	18.9	100.0
Pesticides and lime	26.8	21.1	21.5	21.5	9.1	100.0
Fuel and oil	12.7	17.3	20.9	25.0	24.1	100.0
Electricity	23.7	18.3	18.3	20.8	18.9	100.0
Other:						
Machinery expenses	8.0	14.6	21.3	27.4	28.7	100.0
Machine hire, customwork, and contract labor	19.8	15.4	17.2	22.1	25.5	100.0
Livestock expenses	27.3	17.6	20.1	21.4	13.6	100.0
Other operating expenses	32.0	19.6	17.1	16.9	14.4	100.0
Interest:						
Real estate	15.9	19.4	21.4	22.6	20.7	100.0
Nonreal estate	21.0	19.7	21.5	22.6	15.2	100.0
Wages to hired labor	41.5	21.7	16.4	12.8	7.6	100.0
Net rent to operator landlords	11.0	17.8	21.9	25.9	23.4	100.0
Building expenses	11.0	15.6	19.2	24.0	30.2	100.0
Household expenses	2.8	7.2	11.1	17.7	61.2	100.0
Total production expenses:						
Excluding farm households	23.2	18.2	19.4	20.9	18.3	100.0
Including farm households	22.3	17.7	19.1	20.8	20.1	100.0
Net farm income	59.9	19.5	15.4	9.1	-3.9	100.0

to \$99,999 class, and the three highest sales classes accounted for 21 percent.

Total expenses including and excluding farm household expenses followed the same distributional pattern; the \$500,000 and over class took the largest share (22 percent), followed by the \$40,000 to \$99,999 class (21 percent), the \$100,000 to \$199,999 class (19 percent), the \$200,000 to \$499,999 class (18 percent), the \$20,000 to \$39,999 class (7 percent), the \$10,000 to \$19,000 class (5 percent), the \$5,000 to \$9,999 class (3 percent), the \$1,000 to \$2,499 class (less than 3 percent), and the \$2,500 to \$4,999 class (2 percent). Farms with sales of more than \$40,000 made up 29 percent of all U.S. farms but accounted for 82 percent of total expenses.

Livestock sector expenses centered on farms with sales of \$200,000 and over, which made up only 4.7 percent of the 2.4 million farms, yet showed 79.4 percent of net farm income before accounting for inventory changes. Farms with sales between \$40,000 and \$199,999 absorbed many of the major crop expenses. Although these sales classes contained an estimated 24.1 percent of all farms, they earned only 24.5 percent of net farm income before accounting for inventory changes.

Total cash income (excluding net CCC loans) fell 1.7 percent to \$141.9 billion in 1982. Cash receipts less CCC loans declined 2.9 percent to \$136.2 billion, offsetting a near doubling of direct Government payments. Concurrently, total cash expenses excluding farm household expenses rose 1.8 percent to \$113.4 billion, leaving net cash income at \$28.5 billion excluding CCC loans, down 14 percent. In constant (1972) dollars, net cash income fell about 18 percent to \$13.8 billion. Nominal net cash income (excluding CCC loans), which is the residual cash available for purchasing capital assets, retiring loans, and operating the farm household, declined for the third consecutive year since the 1979 record of \$38.4 billion, and fell to about the level attained in 1977. California accounted for 13 percent of total net cash income at nearly \$3.7 billion, followed by Wisconsin with \$1.6 billion, and Iowa with \$1.5 billion. On a per-farm basis, California farms averaged \$46,093 in 1982 compared with \$1,244 a year earlier.

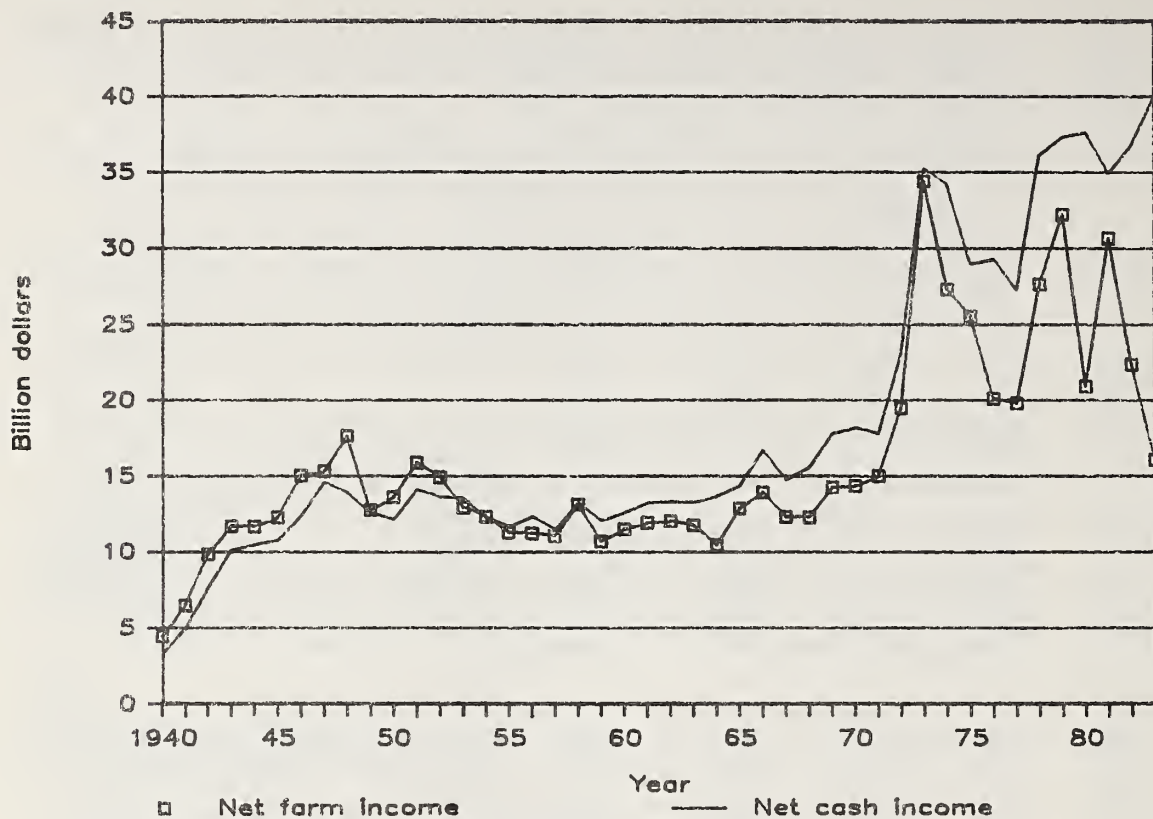
While net cash income (excluding CCC loans) declined in 1982, net farm income, another measure of the well-being of the farm sector, declined about 27 percent to \$22.3 billion (fig. 7). California, with \$3 billion, or 14 percent, of total U.S. net farm income, was the leading farm income State followed by Florida with nearly \$1.4 billion, and Iowa almost \$1.2 billion. The top five States accounted for 35 percent of total net farm income in 1982 compared with 38 percent in 1981.

Net farm income is the return to farm operators from a given year's production for their labor, management, and capital investment in land and equipment. Nearly all of the decline can be attributed to the large swing in the value of inventory change.

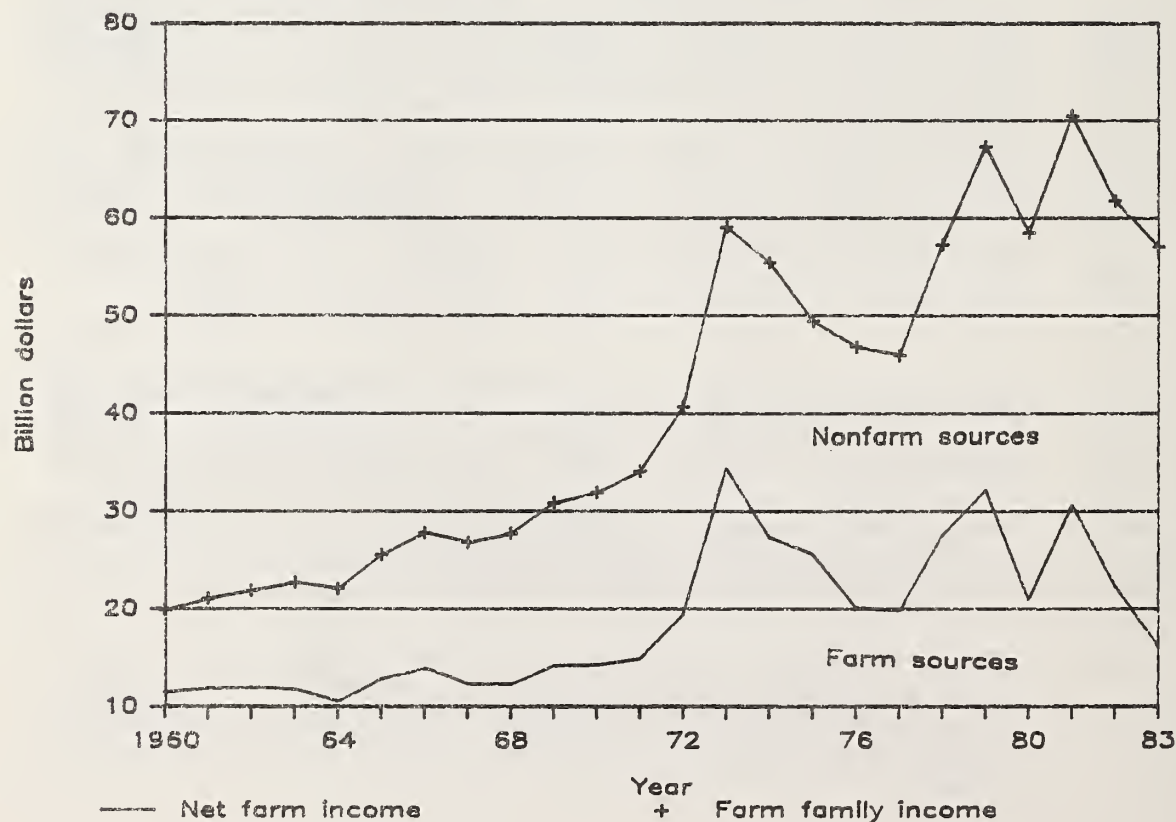


Figure 7

# NET FARM AND NET CASH INCOME, 1940-83



## TOTAL FARM INCOME, 1960-83



Net cash flow is a measure of the change in cash available for household consumption, business operations, or acquisitions of land and buildings. Net cash flow fell 17 percent to \$33.4 billion in 1982 when a smaller rise in loans outstanding, reduced rental income, and lower net cash income offset reduced capital expenditures.

Off-farm income in 1982 reached an estimated \$39.4 billion, down 1 percent from the \$39.8 billion of 1981. Per-farm income from all sources fell 12 percent in 1982 to \$25,731 but was still the third highest on record. In 1972 dollars, total income per farm fell 17 percent to \$12,438 compared with the record \$19,814 of 1973.

Income Dis-  
tributions by  
Value of Sales  
Class

Aggregate farm income statistics provide useful indicators of income and financial trends, but aggregate indicators can mask the circumstances of smaller subgroups of farmers where financial situations are likely to vary widely. The income and balance sheet data, by value of sales class, provide another view of the economic well-being of farm people and farm businesses.

Disaggregated data reveal that a relatively small number of large farms account for a substantial share of total agricultural product sales. Only 1 percent of farms had sales of \$500,000 or more in 1982, but these farms accounted for 30 percent of total cash receipts and 11 percent of total farm assets. Farms with sales of \$100,000 or more accounted for 12 percent of all farms in 1982 and accounted for 68 percent of total cash receipts and 47 percent of total farm assets (table 22).

About 89 percent of farm operators earning \$500,000 or more reported farming as their primary occupation in the 1978 Census of Agriculture. Eleven percent reported a nonfarming occupation. Less than 9 percent of all farmers with sales of \$500,000 or more reported their age at 65 years or older, including farmers whose primary occupation was not farming. Operating a large farm commands much time and attention, which explains why off-farm income earned only 5 percent of total operator income. Income per operator including off-farm income averaged \$575,028 in 1982.

By contrast about 60 percent of all farmers had sales of less than \$20,000 and accounted for only 6 percent of total cash receipts and 10 percent of farm assets. According to the 1978 Census of Agriculture, 64 percent of operators with sales of less than \$20,000 reported an occupation other than farming. About 14 percent of operators who reported farming as their primary occupation were 65 years or older. Apparently about 78 percent of farms with sales of less than \$20,000 were rural residences for retirees and nonfarmers. As a result, a sharp contrast exists between off-farm income earnings of \$28 billion compared with the minus-\$1-billion income earned from all farm sources.

Table 22—Cash receipts and number of farms by value of sales class, 1970-82

Item	:	:	:	Percentage
	:	1970	:	1982
	:	:	:	change in
	:	:	:	market
	:	:	:	distribution
	:			
	:			Percent
	:			
Cash receipts:	:			
\$100,000 and over	:	31.1	68.4	120.0
\$20,000 to \$99,999	:	41.4	25.3	-39.0
Less than \$19,999	:	27.5	6.3	-77.0
All farms	:	100.0	100.0	100.0
	:			
Number of farms:	:			
\$100,000 and over	:	1.8	12.3	583.0
\$20,000 to \$99,999	:	28.2	27.8	-1.0
Less than \$19,999	:	70.0	59.9	-14.0
All farms	:	100.0	100.0	N/A
	:			

N/A = not available.

Operators with farm sales of \$20,000 to \$100,000 of agricultural products averaged the lowest income from farm and off-farm sources. Their farm earnings were much lower than the large farmers, and their off-farm income earnings were much lower than small farmers. Seventy-four percent of these farmers reported farming as their primary occupation and that they were under 65 years old. In contrast to large farmers, off-farm income reached 81 percent of total income. Farm and off-farm income averaged \$14,352 per operator for this group, about 56 percent of the U.S. average for all farmers. Farms with sales of \$20,000 to \$100,000 made up 28 percent of all farms and accounted for 25 percent of total cash receipts and 35 percent of total farm assets.

Farms with sales of over \$100,000 earned 84 percent of their total income from farm sources. These farms, on the average, also carried larger debt loads, making them highly susceptible to changes in farm production and marketing conditions. Farms with sales of more than \$100,000 accounted for about 47 percent of all farm assets, but they held 57 percent of all farm debt. Farms with sales of more than \$100,000 carried an average debt-to-asset ratio of over 23 percent. The debt-to-asset ratio for farms with sales of less than \$20,000 ranged slightly less than 14 percent. Changes in the outlook for



farm income will affect all farm families. However, changes in the general economy affecting nonfarm employment and wages may have a greater impact on smaller farmers, given their heavy dependence on off-farm income sources.

The share of cash receipts of farms with sales of more than \$100,000 doubled from 1970 to 1982, reaching 31 percent in 1970 and 68 percent in 1982 (table 22). The market share of medium-size farms with sales of \$20,000 to \$99,999 declined from 41 percent in 1970 to 25 percent in 1982, a 39-percent decline in market share. The market share of farms with sales of less than \$20,000 declined 77 percent from 1970 to 1982.

Table 23—Farm income and off-farm income by value of sales class, 1970-82

N/A = not available.

Off-farm income for medium-size farms, however, increased from \$2,519 in 1970 to \$11,561 in 1982 per farm, a 359-percent increase. Off-farm income was 21 percent of total income earned by medium-size farms in 1970, but, by 1982, the percentage expanded to 77 percent. Thus, medium-size farms may be increasingly affected by changes in the general economy which, in turn, influence nonfarm employment and income much like that of small farmers.

#### Farm Assets and Liabilities

Farm asset values, excluding farm households, totaled \$943 billion on January 1, 1983, a drop of \$35 million from January 1, 1982. The value of farm real estate, which accounted for about 75 percent of farm assets, declined 6 percent during 1982. Farm debt outstanding increased 8 percent, reaching \$202.8 billion (table 20). The increase in debt and decrease in asset values resulted in equity declining 6.3 percent, the second decline in the farm sector's net worth since 1954.

The debt-to-asset ratio increased from 19.3 percent to a record-high 21.5 percent during 1982, indicating the risk involved in loaning funds because farmers with large debt-to-asset ratios are most likely to experience cash flow problems.

#### Cash Flows

Cash flow analysis is concerned with the adequacy of current cash flows to meet family living needs, acquire farm production capital, pay operating expenses, and repay loans. Interest paid increased 117 percent from 1978 to 1982. In 1983 interest paid declined 4.2 percent (table 9). The 16.8-percent decrease in the average interest rate was primarily responsible for the 4.2-percent interest payment decrease because total outstanding debt increased only 3.2 percent. From 1978 to 1981, the average interest rate paid increased 34 percent.

In response to declining cash farm income and the increasing burden of servicing farm debt, farmers reduced farm expenditures for machinery and buildings and perhaps shifted away from borrowing to purchase farm real estate in 1982. However, with the \$4.7-billion decline in net cash income in 1982, farmers borrowed \$5.8 billion to finance their current outlays (table 24). For the purposes of cash flow analysis, net cash income excluding net CCC loans was used.

#### Farmland Purchases and Financing

Data on farmland purchases and sales for operators were collected in the 1982 Farm Production Expenditure Survey (FPES), the first time land purchases and sales data have been collected in an annual survey of farmers. Previous real estate market data published by ERS were based on an unweighted sample of real estate brokers and dealers. According to the FPES data, operators and landlords purchased \$7.7 billion in farmland in 1982, paying \$2.6 billion in cash, and financing the remaining \$5.1 billion (table 25).

Data on farm real estate purchases by operators and landlords were collected only twice before the 1982 FPES. The value of farm real estate purchased by operators and landlords

Table 24—Changes in financing of capital expenditures and current operating expenses, 1975-82

Item	:	:	:			
	:	Cash	:	Financing		
	Current	income	:			
	outlays 1/	from	Demand for	Net	Percent of	
:	farming	credit 3/	borrowing	demand		
:	2/	:	4/	financed		
<hr/>						
	:	Million dollars			Percent	
	:					
1975	:	74,128	28,971	N/A	N/A	N/A
1976	:	81,762	29,328	N/A	N/A	N/A
1977	:	86,973	27,258	N/A	N/A	N/A
1978	:	98,966	36,333	N/A	N/A	N/A
1979	:	117,164	38,377	N/A	N/A	N/A
1980	:	123,283	37,257	N/A	N/A	N/A
1981	:	128,377	32,950	N/A	N/A	N/A
1982	:	127,780	28,488	N/A	N/A	N/A
	:					
Change from—	:					
1975 to 1976	:	7,634	357	7,277	7,555	103.8
1976 to 1977	:	5,211	-2,070	7,281	8,733	119.9
1977 to 1978	:	11,993	9,075	2,918	10,203	349.7
1978 to 1979	:	18,198	2,044	16,154	16,122	99.8
1979 to 1980	:	6,119	-1,120	7,239	10,034	138.6
1980 to 1981	:	5,094	-4,307	9,401	11,663	124.1
1981 to 1982	:	-597	-4,462	3,865	5,762	149.1
	:					

N/A = not applicable.

1/ Gross capital expenditures and cash production expenses.

2/ Beginning with 1978, cash receipts from farm marketings excludes CCC farm loans made and repaid but includes loans forfeited.

3/ Change in current outlays less change in cash income.

4/ Excludes borrowing for land purchases.

amounted to \$2.3 billion in 1970 based on the 1970 Census of Farm Finance, and \$8.8 billion in 1979 based on the 1979 Census of Farm Finance.

Estimates of annual borrowing for farm real estate purchases based on existing borrowing by purpose data appear in table 25. Farm borrowing data, by purpose of loan, are not available annually except for the Federal land banks and the FmHA. Estimates of net borrowing to purchase farm real estate from the Federal land banks and the FmHA are combined with net borrowing secured by farm real estate from life insurance companies, commercial banks, individuals, and others in table 25 to estimate total net borrowing to purchase farm real estate.



Table 25—Financing of farm real estate purchases, 1975-82

Item	:	:	:	:	:	:	:	:	:
	:	1975	: 1976	: 1977	: 1978	: 1979 1/	: 1980	: 1981	: 1982 2/
	:	:	:	:	:	:	:	:	:
	:								
	:								
	:								
	:								
Farm real estate sold	:	N/A	N/A	N/A	N/A	8,068	N/A	N/A	N/A
By operators	:	N/A	N/A	N/A	N/A	5,042	N/A	N/A	3,053
To other operators	:	N/A	N/A	N/A	N/A	3,917	N/A	N/A	2,636
For nonfarm purposes	:	N/A	N/A	N/A	N/A	1,125	N/A	N/A	417
	:								
By landlords	:	N/A	N/A	N/A	N/A	3,026	N/A	N/A	N/A
To other operators	:	N/A	N/A	N/A	N/A	2,039	N/A	N/A	N/A
For nonfarm purposes	:	N/A	N/A	N/A	N/A	987	N/A	N/A	N/A
	:								
	:								
Farm real estate purchased	:	N/A	N/A	N/A	N/A	8,759	N/A	N/A	7,682
By operators	:	N/A	N/A	N/A	N/A	7,954	N/A	N/A	6,976
By landlords	:	N/A	N/A	N/A	N/A	805	N/A	N/A	706
	:								
	:								
Financing of farm real estate purchases:	:								
Net farm borrowing to purchase real estate:	:								
Federal land banks	:	722	802	860	946	1,573	1,751	2,153	926
Farmers Home Administration	:	137	92	263	270	548	449	335	95
Life insurance companies 3/	:	399	630	1,322	1,548	1,580	713	145	-238
Commercial banks 3/	:	309	454	919	723	81	126	-314	63
Individuals and others 3/	:	1,401	1,494	2,298	2,156	3,948	2,141	1,490	236
Statistical discrepancy 4/	:	N/A	N/A	N/A	N/A	-1,548	N/A	N/A	3,990
Total net borrowing, including statistical discrepancy	:	2,968	3,472	5,662	5,643	6,182	5,180	3,809	5,072
	:								
Amount paid in cash	:	N/A	N/A	N/A	N/A	2,577	N/A	N/A	2,610
	:								
	:								
Total financing of farm real estate purchases	:	N/A	N/A	N/A	N/A	8,749	N/A	N/A	7,784

N/A = not available.

1/ From 1979 Agriculture Census of Farm Finance.

2/ From the 1982 Farm Production Expenditure Survey for operators. Landlord purchases are estimated.

3/ Assumes all the net increase in debt from life insurance companies, commercial banks, individuals, and others is for real estate purchases.

4/ Financial conditions probably forced sellers to provide concessionary financing in 1982, thus explaining the large statistical discrepancy in 1982.

Real estate and nonreal estate debt in the balance sheet refer to the security of the loan and not to the purpose. The statistical discrepancy of \$1.6 billion between the 1979 Agricultural Census of Finance benchmark and the annual estimation methodology arises because the Census figure probably includes nonreal estate borrowing used for farmland purchases. Despite the statistical discrepancy, the annual borrowing estimates in table 25 provide an indication of the trends in farm real estate purchases and borrowing not otherwise available.

The estimated \$1.1 billion borrowed for 1982 real estate purchases based on borrowing by purpose data (net borrowing excluding statistical discrepancy) contrasts sharply with the \$5.1 billion borrowing for real estate purchases based on FPES data in 1982, a difference of \$4 billion. Why does this large statistical discrepancy occur in 1982 but not in 1979? And how was the large amount of \$7.8 billion of real estate purchased financed in a period experiencing declining cash farm incomes, high interest rates, and moderate total debt increases compared with 1979?

Low cash farm incomes and high interest rates compared with previous years probably forced sellers of farmland to provide an increasing level of financing at favorable interest rates and terms. Another factor forcing sellers to provide concessionary financing was that they could not postpone sales. For example, gross capital expenditures for machinery and buildings declined 30 percent from 1979 to 1982 when farm operators postponed purchases. However, farmland sales declined by only 11 percent, indicating that many farm sales could not be postponed. Some of the reasons for not postponing sales included retirement, the need to transfer the farm to the next generation, and the financial need by some farmers to use cash gained from farmland sales to pay off existing farm debt.

#### Capital Flows

Capital expenditures in 1982 for land improvements, motor vehicles, tractors, other machinery and equipment, and buildings for farm production purposes dropped 18.9 percent to \$13.6 billion (table 26). Except for trucks, high prices blunted purchases, resulting in a decline in total expenditures. Capital expenditures on tractors and other farm machinery showed the greatest declines when farmers postponed purchases because of high prices on farm equipment, high interest rates, and the decline in the farmers' cash income. Capital expenditures on all structures and service buildings excluding operators' dwellings fell 11.2 percent in 1982 to \$3 billion. Expenditures for land improvements dropped 37.4 percent to \$924 million, the smallest expenditure since 1974.

Saving is important in nonfarm sectors for capacity expansion, job expansion, increased production, and increased efficiency. In the farm sector, saving is important for capital formation to reduce production costs by maintaining and increasing

Table 26—Farm sector capital flows (excluding farm households), 1972-82

Item	:	:	:	:	:	:	:	:	:	:	:	:
	:	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	:	:	:	:	:	:	:	:	:	:	:	:
	:	Million dollars										
Gross capital expenditures	:	7,480	10,172	11,444	12,384	13,968	15,012	17,948	19,874	17,959	16,829	13,640
Land improvements	:	303	453	592	1,641	1,400	1,526	1,265	1,126	1,247	1,475	924
Service structures	:	1,482	2,072	2,657	2,090	2,571	2,905	3,944	4,462	3,943	3,221	2,857
Tractors	:	1,418	1,923	2,236	2,460	2,648	2,776	3,283	3,746	3,683	3,740	2,877
Trucks	:	672	733	864	1,083	1,547	1,652	1,829	2,054	1,756	1,522	1,514
Automobiles	:	374	410	305	290	409	496	469	484	374	390	364
Other machinery and equipment	:	3,231	4,581	4,790	4,820	5,393	5,657	7,158	8,002	6,956	6,481	5,104
Inventory change	:	861	3,406	1,611	4,444	1,548	2,325	2,091	4,945	-5,336	7,635	-2,560
Crops	:	416	1,588	-2,065	4,444	-860	2,325	2,091	4,086	-6,675	7,349	-1,870
Livestock	:	445	1,818	454	-1,045	-688	-1,245	-1,275	859	1,339	286	-690
Gross saving 1/	:	8,341	13,578	9,833	15,783	12,420	16,092	18,764	24,819	12,623	24,464	11,080
Capital consumption allowances 2/	:	6,721	7,540	8,928	10,604	11,794	13,166	14,348	16,123	17,787	19,519	19,765
Depreciation	:	6,598	7,389	8,813	10,450	11,644	13,020	14,188	15,943	17,491	19,188	19,423
Service structures	:	1,358	1,569	1,915	2,012	2,158	2,535	2,764	3,042	3,361	3,578	3,381
Tractors	:	1,120	1,264	1,610	2,009	2,359	2,449	2,717	3,176	3,621	4,086	4,050
Trucks	:	740	797	871	1,012	1,247	1,538	1,628	1,851	1,846	2,105	2,207
Automobiles	:	377	396	408	411	438	575	640	671	670	840	870
Other machinery and equipment	:	3,003	3,363	4,009	5,006	5,442	5,923	6,439	7,203	7,993	8,579	8,915
Accidental damage	:	123	151	115	154	150	146	160	180	296	331	342
Service structures	:	109	137	100	139	135	131	145	164	272	304	314
Vehicles and machinery	:	14	14	15	15	15	15	15	16	24	27	28
Net capital transfers	:	2,510	2,486	3,966	3,918	5,736	2,411	1,241	824	87	2,027	1,209
Farmland 3/	:	2,510	2,486	3,966	3,918	5,736	2,411	1,241	824	87	2,027	783
Machinery and vehicles	:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	426
Net capital formation 4/	:	-890	3,552	-3,061	1,261	-5,110	515	3,175	7,872	-5,251	2,918	-9,884
Gross capital disappearance plus net capital formation 5/	:	8,341	13,578	9,833	15,783	12,420	16,092	18,764	24,819	12,623	24,464	11,080

1/ Gross capital expenditures and inventory change. 2/ Depreciation and accidental damage. 3/ Farmland sold to nonfarm sectors. 4/ Gross saving less capital consumption allowances and net real estate transfers. 5/ Gross capital disappearance equals capital consumption allowances and net real estate transfers.



efficiency. Saving in the national income and product accounting (NIPA) framework is defined as current production not consumed. Annual gross savings are the expenditures for machinery, motor vehicles, and service buildings plus inventory change during the year. A farm sector measure of saving comparable to the NIPA saving definition is not available. However, gross capital expenditures as a percentage of cash farm income provides an alternate saving definition to monitor investment behavior. Gross capital expenditures as a percentage of cash farm income declined from 51.1 percent in 1981 to 47.9 percent in 1982, a slight 3.2-percent decline in the saving rate. Because the saving rate decline was negligible, the \$4.5-billion drop in cash income of farm proprietors was primarily responsible for the \$3.2-billion decline in gross capital expenditures in 1982.

Besides purchasing machinery and equipment, farm operators can use other means for obtaining the use of capital, including renting (primarily land), customwork, hired transportation, and leasing. It is extremely difficult to separate statistically customwork and hired transportation services into their capital, labor, and current input components. For example, custom fertilizer applications can involve a labor input (the machine operator), a capital input (the fertilizer applicator), and a current production input (fertilizer). In past farm surveys, many farmers could not separate the value of fertilizer applied from the value of custom application services. As a result of their non-responses, farmers are not requested in current farm surveys to separate the value of custom application from the value of fertilizer applied.

Leasing increased and capital expenditures decreased when farm income declined from 1980 to 1982. However, leasing still remained at a relatively low amount compared with the amount of capital expenditures. The cash flow generated from the investment credit and depreciation may offset the cash saved from leasing for many farmers, even in years of declining farm income. For example, farms with sales of more than \$100,000 made up only 12 percent of all farms but accounted for 68 percent of total cash receipts in 1982. They averaged \$89,171 total income per farm including off-farm income, which probably placed them in the 50-percent tax bracket. Therefore the cash saved from the investment credit and depreciation may be more important to them than the cash saved from leasing.

Sales of capital assets totaled about \$3.5 billion in 1982. Farm operators reported selling \$2.6 billion of farmland to other farmers (table 25), \$417 million of farmland to nonfarm sectors, and \$426 million of outright machinery sales in the 1982 FPES. Sales of farmland may be primarily by older farmers. Funds generated from the sales of capital assets may be used for a variety of purposes including financing new machinery, building and land purchases, paying off existing debt, and supporting retirement.

Sales of farmland and machinery of \$3.5 billion in 1982 constituted 12 percent of the \$28.5 billion of cash income from farming. Or, from another perspective, sales of capital assets of \$3.5 billion made up 51 percent of the \$6.9-billion increase in total farm debt excluding CCC loans.

The age of the farm capital stock has increased as depreciation has exceeded capital expenditures in 1981 and 1982. The increasing age of capital stock, though, has not been significant enough to affect the expenses for repairing and maintaining capital. Repair and maintenance expenses increased less than 2 percent in 1982, almost the same as the 2-percent increase in total production expenditures. Capital consumption allowances exceeded gross capital expenditures by \$2.7 billion in 1981 and \$6.1 billion in 1982. On balance, the value of farm machinery and buildings totaled \$148 billion as of January 1, 1984. Thus the impact of negative farm machinery and building investments on the age of capital stock and repair expenses appears to have been negligible in 1982.

On the other hand, estimates of repair and maintenance data in the farm production expense series may not fully reflect the impacts of negative farm machinery and building investments. For example, some repair and maintenance expenses can be postponed in the short run. Also farmers may have elected in 1982 to perform many of the repair operations that were previously out-of-pocket cash costs. The large acreage reductions also decreased machinery usage, and consequently, repair expenses.

#### Summary of Capital and Cash Flow Trends

Given the decline in cash farm income and continued high interest rates, farm operators have made several structural shifts in their expenditures for farm machinery, buildings, and farmland as well as in its financing. These shifts include:

- o Reasonably steady farm sector saving rates, but the declines in cash farm income have produced decreased amounts of capital expenditures;
- o financing of capital expenditures and operating expenses shifting dramatically from borrowing to internal funds generated from saving, depreciation, and capital transfers;
- o expensive short-term debt being restructured into less expensive long-term debt to obtain more favorable repayment terms;
- o leasing not increasing appreciably because many farmers desire the cash flow savings generated from the investment credit and depreciation;
- o steady repair and maintenance expenses for capital items, however, perhaps being postponed in the short run;

- o land purchasing not declining as sharply as capital expenditures because sellers probably did not postpone land sales; and
- o concessionary financing of farmland sales by sellers probably increasing dramatically.

#### INCOME AND EMPLOYMENT IN THE FOOD AND FIBER SECTOR

One procedure for measuring the total contribution of all sectors involves the use of input-output (I/O) analysis. The general procedure uses as input real or constant dollar measures of the final demands as against derived demands for food and fiber products for further use in the system. An I/O analysis of these final demands (food, clothing and shoes, tobacco, exports inventory change, and net Government purchases) yields estimates of total business activity measured in constant dollars needed throughout the economy to support the delivery of these demands. These estimates are adjusted for labor productivity changes, price changes, and the relatively lower income elasticity of demand for farm products.

The food and fiber system accounted for 20.4 percent of employment in the domestic U.S. economy and 20 percent of total GNP in 1982 (table 27). Approximately 22.5 million workers were employed in the food and fiber sector. The farm sector employed 3.1 million people, or 2.8 percent of total U.S. employment. Nonfarm food and fiber sector employment decreased from 20 million in 1981 to 19.4 million in 1982. This decrease resulted from a lower volume of agricultural exports and a drop in farm inventories in 1982. These two smaller real demands offset the slight increase in domestic food and clothing demands. But declines in the relative share of the food and fiber system of the total demand for goods and services in the U.S. economy was an unusual circumstance in a recessionary year. Because of the relative stability of food and clothing demands, output of the food and fiber system is less influenced by business cycles. As in the 1975 recession, the food and fiber system contributed to the economic stability of the overall economy, employing one in five eligible workers.



Table 27—The food and fiber sector and the domestic economy, 1973-82

Item	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Millions										
Employment:										
Farm sector	3.4	3.3	3.4	3.0	3.0	2.9	3.3	3.0	3.2	3.1
Nonfarm sectors	17.4	17.5	17.6	17.5	18.1	18.8	19.4	19.1	20.0	19.4
Food processing	1.8	1.7	1.7	1.6	1.7	1.7	1.8	1.7	1.8	1.7
Manufacturing	3.7	3.8	3.7	3.7	3.8	4.0	4.1	4.0	4.2	4.1
Transportation, trade, and retailing	6.7	6.7	6.8	6.8	7.0	7.3	7.6	7.6	8.0	7.7
Eating establishments	2.9	3.0	3.0	3.0	3.1	3.2	3.2	3.2	3.2	3.2
All other	2.3	2.3	2.4	2.4	2.5	2.6	2.7	2.6	2.8	2.7
Total food and fiber sector	20.8	20.8	21.0	20.5	21.1	21.7	22.7	22.1	23.2	22.5
Total domestic economy 1/	89.4	91.9	93.8	96.2	99.0	102.3	105.0	106.9	108.7	110.2
Percent										
Food sector	3.8	3.6	3.6	3.1	3.0	2.8	3.1	2.8	2.9	2.8
Nonfarm sectors	19.5	19.0	18.8	18.2	18.3	18.4	18.5	17.9	18.4	17.6
Total food and fiber sector	23.3	22.6	22.4	21.3	21.3	21.2	21.6	20.7	21.3	20.4
Total domestic economy	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Billion dollars										
Value added by activity: 2/										
Farm sector	47.2	43.5	48.9	41.1	45.0	53.4	71.6	64.2	81.1	74.1
Nonfarm sectors	226.1	240.3	277.2	297.1	297.1	367.0	418.7	444.3	525.1	535.4
Food processing	33.3	34.7	40.8	42.5	48.8	51.6	59.4	59.0	72.5	71.5
Manufacturing	44.1	47.2	55.2	59.4	66.4	73.9	82.6	87.4	102.1	105.3
Transportation, trade, and retailing	81.8	87.7	99.0	106.4	119.1	131.0	149.6	161.6	189.3	193.0
Eating establishments	18.5	20.1	23.1	25.1	27.5	30.4	33.3	35.6	39.1	42.6
All other	48.4	50.6	59.1	63.7	72.6	80.1	93.8	100.7	122.1	123.0
Total food and fiber sector	273.3	283.8	326.1	338.2	342.1	420.4	490.3	508.5	606.2	609.5
Total domestic economy	1,326.4	1,434.2	1,549.2	1,718.0	1,918.3	2,163.9	2,417.8	2,631.7	2,954.1	3,073.0
Percent										
Food sector	3.6	3.0	3.2	2.4	2.3	2.5	3.0	2.4	2.7	2.4
Nonfarm sectors	17.0	16.8	17.9	17.3	17.4	17.0	17.3	16.9	17.8	17.4
Total food and fiber sector	20.6	19.8	21.1	19.7	19.7	19.5	20.3	19.3	20.5	19.8
Total domestic economy	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1/ Represents the available work force.

2/ Value added equals profits, rent, interest, wages, indirect business taxes, and depreciation.

# New Evidence on the Diversity of Agricultural Income and Expense Accounts

James Johnson\*  
Annette Clauson

This article illustrates how national survey data can be used to disaggregate farm income estimates by type and size of farm by using sample survey data from the Farm Production Expenditure Survey (FPES), which was conducted jointly by the Economic Research Service (ERS) and the Statistical Reporting Service (SRS). Farm income and balance sheet estimates currently are published only in total or by sales class, providing a limited perspective on how incomes, debts, and assets may be changing on farms that produce different commodities or use different inputs. This article (1) highlights the changes made to begin to collect data necessary to disaggregate expense, receipt, and income accounts by type and size of farm, (2) discusses research results for two initial acre and sales class disaggregations, and (3) indicates research efforts that will be initiated to use primary survey data to disaggregate further the economic accounts by type of business, form of ownership, and primary occupation of the operator. The results discussed in this paper are part of a research effort of ERS to develop a broader perspective on how changes in economic or biological factors affect the well-being of different types or sizes of farms.

Procedures used to develop estimates of farm income or the balance sheet for U.S. agriculture have changed over time to reflect changes which have occurred in farming and the agricultural data system. For example, the accounts have been revised and disaggregated to provide State estimates in 1949 and distributions of income and expense items by sales class in 1960. The latest revision in the format for estimating and publishing the farm sector accounts was implemented in 1980.

The revised accounts allowed the separation of income and balance sheet estimates into components which would permit the earnings of the farm business to be separated from those of the household. The accounts were also devised so that a more precise and conceptually consistent analysis of the income and wealth position of the farm business could be developed by type of farm, ownership of production resources, size of unit in terms of sales, land units, labor use,

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\*Johnson is branch chief and Clauson is an agricultural economist, Economic Indicators and Statistics Branch, National Economics Division, ERS.

primary occupation of the operator, form of business organization, and other groupings. The revised accounts offer improvement inasmuch as the various sources of receipts and expenses in the farm sector can be better understood and used in analyses of economic performance.

But, even with the revised income accounts, published data series remain at a highly aggregated level, either nationally, statewide, or according to economic sales classes. Available data series preclude analyses of changes in the income and balance sheet of farms and farm operators by type, size, and location of business, type of ownership, or primary occupation of the operators. Analyses are limited by available data which can be reliably used to develop benchmark estimates for new, more disaggregated series.

The ability to focus analyses more specifically on certain types and kinds of operations was, perhaps, not too important when the sector was composed of several million farms, mostly small and mostly reliant on agriculture for family income. With relative homogeneity within the sector, aggregate measures could be used to discuss economic well-being of the component parts. Agriculture has become increasingly heterogeneous, and as a result, economic accounts and data series constructed in the absence of structural considerations have become increasingly ineffective in providing insight into the well-being of the various agricultural subpopulations.

#### FARM SURVEY DATA

The procedures used to develop estimates of farm income have treated agriculture as though it were simply a large farm. Net farm income has been derived as a residual by first developing an estimate of gross receipts, then deducting an estimate of aggregate production expenses. The data underlying annual farm income estimates are largely devoid of structural considerations. For example, cash receipts are developed by commodity and by State using estimates of production, marketings, and prices obtained from SRS. Data from a variety of SRS reports and other sources are also used to estimate aggregate production expenses. Annual receipts, expenses, and income estimates are benchmarked to the 5-year Census of Agriculture. Agricultural Census data are also used to develop economic sales class benchmarks, providing a limited structural perspective to the aggregate accounts.

To provide consistent data on farm operator and landlord expenses to produce agricultural commodities, an FPES has been conducted intermittently since 1971, annually since 1977. For the 1982 calendar year, the survey was redesigned to provide farm operator occupation, production, capital expenditure, Government program participation, and expanded crop and livestock sales data in addition to the usual expense data. These data can be used to develop an estimate of farmers' annual cash operating balances based on specifications of size, farm type, or other measures. The primary focus of the survey continued to be the development of reliable national estimates of production expenses.



Income and expense data discussed in this article are based on a sample survey of nearly 14,000 farms and ranches contacted in February and March of 1983. The numbers and percentages of survey contacts, completions, refusals, inaccessibles, nonfarms, and other (duplicates or overlaps) for the individual States and the United States appear in table 1. For survey purposes, a farm was defined as any establishment producing agricultural commodities with annual sales of \$1,000 or more. Types of establishments included in the survey were those listed in the Federal Government Standard Industrial Code (SIC) for agricultural production of crops and livestock. Samples were selected from a combined listing of operators of farms and ranches, and an area frame sample where the 48 contiguous States were divided into small area sampling units. These areas had a known probability of selection. Operators residing in the sample of areas were surveyed under a sampling design developed by SRS.

The data on farm characteristics are estimates for each specific group of farms based on the data obtained from a sample of those farms, possibly leading to sampling errors.<sup>1/</sup> Readers should, therefore, use caution when interpreting the data. The estimates should only be used as a guide to the characteristics of farms in a subpopulation rather than as a precise estimate.

#### CHARACTERISTICS OF SURVEY FARMS

Characteristics of farms grouped by sales class are shown in table 2, which contains weighted average estimates for selected acreage, production, and investment practices of farm operators as reported in the survey.<sup>2/</sup> These physical and financial characteristics help develop a perspective on the marketing and expense patterns of various sizes of farms.

Farm operations with sales of more than \$500,000 contained an average of 3,471 acres. The estimated value of land operated by these farmers as of January 1, 1983, was placed at \$2.43 million. Farm operators in this sales class also reported an average inventory value of machinery and equipment beyond \$295,000 and a net investment of nearly \$11,000 in trucks and tractors during 1982. To supplement owned machinery and equipment, these operators also rented farm equipment, reporting rental expenses of more than \$2,500.

Acreage operated also averaged above 1,000 acres for farms in the \$100,000 to \$499,999 sales classes as well as in the \$40,000 to \$49,999 sales class. The average acreage per farm in the \$40,000 to \$49,999 sales class in 1982 was likely

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<sup>1/</sup> To examine how coefficients of variation vary by size of farm and category of expense, see the article by Prescott and Baum in this issue.

<sup>2/</sup> To determine per-farm averages, divide class totals (sum of a farm's expansion factor multiplied by its observed data) by the expanded number of farms.

Table 1—1982 Farm Production Expenditure Survey Completion Counts

State	Total	Completion	Refusals	Inaccessible	Nonfarm	Other
	Number	Number Percent	Number Percent	Number Percent	Number Percent	Number Percent
Alabama	134	92 69	5 4	8 6	29 22	0 0
Arizona	209	102 49	47 22	28 13	25 12	7 3
Arkansas	331	228 69	49 15	19 6	19 6	16 5
California	1,342	835 62	200 15	105 8	143 11	59 4
Colorado	410	201 49	76 19	58 14	35 9	40 10
Florida	619	401 65	71 11	71 11	48 8	28 5
Georgia	214	144 67	31 14	8 4	23 11	8 4
Idaho	349	198 57	60 17	34 10	31 9	26 7
Illinois	573	331 58	137 24	40 7	57 10	8 1
Indiana	334	161 48	89 27	25 7	49 15	10 3
Iowa	511	283 55	170 33	23 5	26 5	9 2
Kansas	499	240 48	146 29	56 11	45 9	12 2
Kentucky	331	259 78	28 8	15 5	20 6	9 3
Louisiana	261	161 62	29 11	34 13	23 9	14 5
Maryland	136	68 50	27 20	15 11	19 14	7 5
Michigan	507	293 58	96 19	56 11	42 8	20 4
Minnesota	505	285 56	133 26	32 6	47 9	8 2
Mississippi	441	301 68	54 12	21 5	50 11	15 3
Missouri	298	197 66	60 20	12 4	28 9	1 0
Montana	271	135 50	47 17	22 8	22 8	45 17
Nebraska	515	243 47	178 35	44 9	30 6	20 4
Nevada	70	40 57	7 10	17 24	5 7	1 1
New England*	299	208 70	40 13	16 5	24 8	11 4
New Jersey	89	57 64	10 11	8 9	4 4	10 11
New Mexico	150	89 59	11 7	20 13	19 13	11 7
New York	140	95 68	12 9	15 11	14 10	4 3
North Carolina	380	261 69	42 11	15 4	47 12	15 4
North Dakota	127	62 49	27 21	13 10	14 11	11 9
Ohio	374	244 65	66 18	19 5	38 10	7 2
Oklahoma	180	111 62	32 18	23 13	12 7	2 1
Oregon	178	110 62	28 16	7 4	26 15	7 4
Pennsylvania	164	114 70	27 16	10 6	10 6	3 2
South Carolina	75	48 64	6 8	7 9	14 19	0 0
South Dakota	168	93 55	56 33	10 6	7 4	2 1
Tennessee	228	198 87	21 9	0 0	9 4	0 0
Texas	845	560 66	107 13	84 10	79 9	15 2
Utah	120	71 59	12 10	21 18	16 13	0 0
Virginia	137	114 83	10 7	3 2	9 7	1 1
Washington	356	223 63	53 15	29 8	18 5	33 9
West Virginia	82	66 80	4 5	2 2	9 11	1 1
Wisconsin	539	404 75	86 16	17 3	23 4	9 2
Wyoming	187	93 50	35 19	9 5	24 13	26 14
U.S. total	13,678	8,419 62	2,425 18	1,071 8	1,232 9	531 4

\*New England includes Connecticut, Delaware, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

Table 2—Weighted means of selected farm operators by sales class, 1982

Item	: \$500,000 : \$250,000- : \$200,000- : \$100,000- : \$50,000- : \$40,000- : \$25,000- : \$20,000- : \$10,000- : \$2,500- : Less than : or more : \$499,999 : \$249,999 : \$199,999 : \$99,999 : \$49,999 : \$39,999 : \$24,999 : \$19,999 : \$9,999 : \$2,500										
	Acres										
Total acreage	3,471	2,014	1,379	1,120	770	1,267	438	277	264	126	81
Cash-rented acreage	949	615	381	241	187	116	105	58	33	22	11
Share-rented acreage	315	292	274	171	118	110	54	45	29	5	3
Crop acreage:											
Corn	226	181	148	100	56	43	34	24	13	4	2
Small grains	259	238	159	131	97	76	55	37	21	6	2
Soybeans	163	154	178	97	54	40	28	20	14	4	0
Hay	85	64	61	58	52	38	38	23	24	15	9
Sorghum	87	27	22	20	13	15	5	3	4	1	0
Cotton	88	22	12	4	2	1	2	0	0	0	0
Tobacco	1	2	2	2	1	1	1	1	1	0	0
Rice	22	27	4	4	1	1	1	0	0	0	0
Other crops	245	79	57	39	24	11	11	5	4	2	1
Set-aside	51	33	16	17	8	12	5	5	2	0	0
Peak number of hired workers:	40	7	5	4	3	3	2	2	2	1	1
Livestock purchases:											
Beef cattle	194,372	18,619	7,713	3,670	2,412	535	659	730	653	300	83
Dairy cattle	5,949	2,671	1,090	1,828	985	336	642	209	324	50	265
Hogs	6,574	3,951	4,350	1,601	780	240	193	315	106	49	15
Value of land operated 1/	2,433,537	1,945,069	1,277,203	674,734	440,393	409,683	301,419	225,232	180,245	98,020	77,875
Value of trucks 1/	42,305	21,768	16,691	10,914	7,822	6,329	5,718	4,341	5,011	3,161	2,713
Value of tractors 1/	100,960	62,910	50,646	34,628	23,026	18,603	14,651	10,052	8,615	4,321	3,237
Value of other machinery 1/	152,789	90,634	81,503	54,702	32,652	26,266	19,466	11,892	9,608	4,394	2,340
Net purchases:											
Autos	1,647	1,068	656	846	583	782	532	243	299	182	253
Trucks	4,462	2,239	1,293	1,245	1,078	930	730	622	725	607	508
Tractors	6,335	4,020	4,316	3,465	1,895	1,721	1,150	815	714	475	352
Miscellaneous machinery	654	367	227	174	150	123	135	107	55	77	118
Farm building repair and maintenance	1,184	380	252	189	94	81	103	80	94	27	49
Rental of farm equipment	2,519	681	977	416	103	70	114	59	29	4	6

1/ Estimated value as of January 1, 1983.



larger than would ordinarily be expected because an operator with relatively large total acreage reported sales for calendar year 1982 that placed the farm in this class, thereby pulling up the weighted average acreage. Farmers placed the value of the land they operated at about \$2 million for operators in the \$250,000 to \$499,999 sales class and \$1.3 million in the \$200,000 to \$249,999 sales class. The estimated total value of land operated fell in the smaller size classes, reflecting the smaller average acreage of farms because the value per acre differed little across farm sizes. The value of trucks, autos, and other machinery in the farm operation also decreased on successively smaller farms, dropping from the \$295,000 estimated for farms with \$500,000 or more in sales to about \$8,000 for farms with less than \$2,500 in sales.

The survey asked farmers to report acreages of crops planted and purchases of livestock. These data show that farms of all sizes planted corn, small grains, hay, and other crops, a category which included vegetables and fruits. Farmers planted hay and small grains on the largest average planted acreages on farms with less than \$10,000 in sales. Small grains, other crops, and corn had the largest average planted acreage on farms with more than \$500,000 in sales, and each of these crops accounted for more than 226 acres. Soybeans had the next largest acreage, averaging 163 acres per farm. Small grains, corn, and soybeans had the largest average planted acreage on farms with sales ranging from \$100,000 to \$499,000.

Cotton plantings, much like the plantings of other crops, appeared to be relatively concentrated on larger farms. Farms with sales of more than \$500,000 had an average planted acreage of cotton of 88 acres in contrast to farms with less than \$100,000 in sales which reported less than 2 acres, on average, in cotton plantings. Rice acreage was also substantially larger on farms with sales of more than \$250,000, averaging more than 22 acres on these farms and fewer than 4 acres per farm on farms with sales of less than \$250,000.

Average acreage set-aside under the 1982 Government commodity programs for wheat, feed grains, cotton, and rice should closely follow the distribution of acreages planted on the program crops, assuming farmers of all sizes chose to participate in the programs. Although specific inferences about the rate of participation of farms of different sizes cannot be drawn from the data in table 2, the information suggests that a large proportion of farmers with sales exceeding \$10,000 chose to participate. Farms with sales beyond \$500,000 averaged 51 set-aside acres while farms with sales of \$250,000 to \$499,999 averaged 33 acres, because of the substantially larger cotton acreages on farms with \$500,000 or more in sales. Farms with sales of \$100,000 to \$199,999 in sales averaged 17 acres in set-aside, most of which would have come primarily from participation in the feed grain and wheat programs because these farms averaged only 4 acres of rice

and cotton per farm. Farms with less than \$20,000 in sales averaged less than 2 acres in set-aside, reflecting the generally small planted acreage of program crops on these farms.

Farm operators were asked to report the peak number of hired workers, including paid family workers, employed during 1982. Farms showing less than \$40,000 in sales reported an average of two or fewer employees at peak hiring. The average rose with farm size. Reflecting the relatively large acreages of fruits, vegetables, and other relatively labor-intensive crops along with large livestock enterprises, farms with sales of more than \$500,000 reported a substantially larger peak number of hired employees, averaging 40 workers per farm in 1982.

#### CASH SOURCES OF INCOME

Survey data indicated that farm operators with sales of \$500,000 or more had average total cash sources of income of nearly \$1.2 million in 1982 (table 3). Crop and livestock sales accounted for most of this income. Livestock sales amounted to 56 percent of the total sales of operators in the \$500,000 sales class. Cattle and calves, hogs, and milk sales accounted for 45 percent of total sales and more than 80 percent of the livestock sales on these farms. Livestock sales, while large, were a relatively less important source of sales on farms with \$20,000 to \$100,000 in sales. On farms of this size, crop sales accounted for half or more of total sales. Although cattle, hay, and milk sales accounted for 90 percent or more of total livestock sales on farms of less than \$250,000 in sales, these commodities accounted for about 80 percent of total livestock sales on farms of more than \$250,000 in sales. Poultry, sheep, and other livestock were relatively more important on the large farms. The smallest of farms (those with less than \$10,000 in sales) also received a predominant share of total sales from livestock.

Crop sales accounted for 44 percent of total sales on farms with sales of \$500,000 or more, 46 percent on farms of \$250,000 to \$499,999 in sales, and less than 40 percent on farms of less than \$10,000 in sales. Feed grains, wheat, soybeans, and cotton sales accounted for about 14 percent of total sales and less than a third of crop sales on farms with sales of \$500,000 or more. In contrast, fruits and vegetables accounted for more than 40 percent of crop sales, and 20 percent of total sales on farms of \$500,000 or more in sales. Only sales of cattle were more important as a source of revenue on these large farms. Sales of fruits and vegetables were also relatively important on farms which sold less than \$10,000.

Feed grains, wheat, cotton, and soybean sales accounted for more than 60 percent of all crop sales on farms with sales of \$20,000 to \$250,000. For farms with average sales of \$40,000 to \$250,000, corn sales were, on average, the largest source of receipts. Even on farms with average sales of \$250,000 to



Table 3—Weighted average sales and other cash income by sales class, 1982

Item	Dollars										
	\$500,000 : or more	\$250,000 :\$499,999	\$200,000 :\$249,999	\$100,000 :\$199,999	\$50,000 :\$99,999	\$40,000 :\$49,999	\$25,000 :\$39,999	\$20,000 :\$24,999	\$10,000 :\$19,999	\$2,500 :\$9,999	Less than \$2,500
Cash sales:											
Livestock and livestock products:											
Cattle and calves	558,110	171,340	94,639	65,167	32,788	18,677	13,889	9,360	6,828	2,843	714
Hogs and pigs	303,010	59,800	27,106	19,874	12,157	8,356	6,626	4,672	4,679	2,178	527
Milk	49,260	29,962	23,444	14,002	5,093	3,945	2,264	2,477	1,006	399	70
	100,790	52,725	35,249	23,907	13,057	4,829	4,092	1,777	859	51	9
Crops											
Corn and soybeans	440,880	143,720	96,590	57,914	31,001	22,773	15,243	10,375	6,298	1,898	282
Wheat, barley, oats	67,970	51,083	48,232	26,166	15,153	9,130	6,421	4,299	2,274	598	34
Cotton and cottonseed	32,687	21,528	15,079	10,447	6,033	4,642	3,297	1,794	1,079	221	36
Vegetables, potatoes, melons	42,637	6,024	3,793	916	374	109	204	18	54	17	3
Fruits, nuts, berries	109,210	12,893	2,528	2,690	643	436	438	241	216	33	17
	73,119	6,174	9,917	3,108	1,497	2,715	676	529	347	152	27
Total cash sales (livestock and crops)	998,990	315,060	191,230	123,080	63,789	41,450	29,132	19,734	13,126	4,742	996
Other cash income											
Government farm program payments:	26,033	11,007	9,309	5,167	2,855	1,361	1,388	480	382	118	54
Customwork	12,167	6,651	4,472	2,872	1,255	956	690	315	276	60	33
Cash dividends	10,603	2,446	3,196	1,664	976	447	560	329	220	50	4
Payments for crop and livestock loss	2,262	1,324	1,072	479	226	162	81	46	28	15	21
	2,568	1,360	929	517	416	119	252	68	53	11	5
Total cash income (total cash sales and other)	1,154,100	335,090	216,460	134,200	69,548	45,042	31,744	20,894	14,309	5,346	1,271
Gains or losses from machinery and equipment sales	1,985	749	1,284	264	502	225	285	210	53	32	49



\$499,999, feed grain, wheat, cotton, and soybean sales accounted for more than half of total crop sales and 25 percent of all sales. Cotton sales, were, on average, more important on farms with sales of \$200,000 or more.

During 1982 all size farms had earnings from other farm-related sources such as farm programs, payments, customwork, dividends, or payments for crop or livestock loss. Government payments were the largest source of other farm-related earnings for all sizes of farms except those with sales of \$20,000 to \$24,999. Customwork provided the next largest source of earnings on all but farms with sales of less than \$2,500.

A strength of primary survey data is the flexibility to rearrange the data to undertake analyses from many different perspectives. In table 4, sales and other cash income data were estimated by acre class of farm instead of by sales class. These data indicate that livestock sales were the primary source of earnings on farms with fewer than 160 acres and on farms with 160 to 499 acres. For those two classes, livestock sales contributed more than 60 percent of total sales. On farms of 1,000 to 1,999 acres, crop sales were the primary source of earnings, accounting for 65 percent of total cash sales. On farms of 500 to 999 acres, crops were slightly more important in 1982, accounting for 51 percent of sales. Farms of more than 2,000 acres showed that livestock sales were slightly more important, again accounting for 51 percent of sales.

Sales of corn, soybeans, wheat, cotton, vegetables, and fruit accounted for nearly 80 percent of total crop sales on farms of more than 160 acres, but only 40 percent of sales on farms of fewer than 160 acres, pointing out the importance of tobacco, peanut, hay, and other crops to the smaller operations.

On a dollar-per-farm basis, sales of corn were largest on farms of 1,000 to 1,999 acres. But when measured as a portion of average total crop sales, corn sales were most important on farms of 500 to 999 acres. In contrast to the sales of corn and soybeans, sales of wheat, barley, oats, and cotton were relatively more important on farms of 1,000 or more acres.

Most other cash sources of income comes either from Government program payments or customwork. Customwork accounted for more than three-fourths of other income on farms of fewer than 160 acres, and Government payments contributed another 11 percent. Payments accounted for a substantially larger portion of other cash income on the larger acre-class of farms, contributing nearly two-thirds of other cash income on farms with 1,000 or more acres. This reflects the importance of cotton, rice, wheat, and feed grain production on the larger farms. The survey data suggest that payments contributed about 0.2 percent of total cash sources of income on farms of fewer

Table 4—Weighted average sales and other cash income by acre class, 1982

Item	Acreage operated				
	Fewer than 160	160 to 499	500 to 999	1,000 to 1,999	2,000 and above
	Dollars				
Cash sales:					
Livestock and livestock products	13,151	37,331	60,795	55,572	140,830
Cattle and calves	2,593	9,699	27,069	33,435	121,950
Hogs and pigs	2,159	6,292	14,418	9,171	5,760
Milk	2,966	17,215	16,736	11,920	7,592
Crops	8,514	22,468	63,986	102,090	133,520
Corn and soybeans	1,276	10,066	30,991	38,609	27,804
Wheat, barley, oats	219	1,909	8,381	19,846	38,049
Cotton and cottonseed	27	262	1,364	5,238	16,981
Vegetables, potatoes, melons	664	2,696	4,687	11,191	15,802
Fruits, nuts, berries	1,458	2,717	5,677	5,533	2,641
Total cash sales (livestock and crops)	21,666	59,800	124,780	157,660	274,350
Other cash income	466	1,486	4,189	9,006	14,796
Government farm program payments	50	638	2,237	5,734	9,484
Customwork	362	585	1,488	2,245	3,078
Cash dividends	51	234	391	596	1,105
Payments for crops or livestock loss	94	129	561	858	1,659
Total cash income (total cash sales and other)	23,919	64,026	137,360	178,740	302,720
Gains or losses from machinery and equipment sales	182	229	353	412	795

than 160 acres but more than 3 percent on farms of more than 1,000 acres.

#### DISTRIBUTION OF PRODUCTION EXPENSES

The distribution of production expenses among farms of different sizes depends upon the technology employed and the mix of commodities produced. Total cash expenses on surveyed farms with sales of more than \$500,000 exceeded \$965,000 (table 5). Purchases of livestock and feed accounted for 42 percent of the cash expenses of these farm operators. Hired labor contributed another 16 percent to the production expenses of these farms. Meanwhile, farms in the \$500,000 and over sales class spent proportionately less for fertilizer, lime, chemicals, seed, machinery repairs, and gas and oil than farms in all but the smallest sales classes. This expense pattern reflects the orientation of farms in the \$500,000 and over sales class toward the production of livestock and other relatively labor-intensive enterprises. Farms in the \$500,000 and over sales class also averaged more than \$93,000 in interest paid during 1982. But interest expenses accounted for only about 10 percent of total expenses on these farms.

Purchased feed accounted for a substantial portion of total cash expenses on all size classes of farms, amounting to more than 15 percent of expenses on farms of less than \$2,500 in sales. Purchased livestock expenses fell off considerably in the smaller size classes. Fertilizers, chemicals, seed, machinery repairs, and gas and oil proportionally increased on farms with more than \$2,500 in sales but less than \$500,000 in sales, reflecting a greater orientation of these farms to crop production. Interest expenses also rose as a part of total expenses on farms with sales between \$25,000 and \$499,999, accounting for 14 to 16 percent of total expenses.

Interest paid and feed purchases were the two major expense categories for farms with less than \$10,000 in sales; interest expenses accounted for 22 percent of total expenses on farms with less than \$2,500 in sales. Besides interest paid, taxes, insurance, electricity and telephone, gas and oil, and livestock expenses accounted for a larger portion of total expenses on farms with less than \$10,000 in sales than on larger operations.

Cash expenses and capital expenditures of farm operators were also derived on an acre-class basis (table 6). When viewed in terms of acreage instead of the value of sales, hired labor expenses exhibited a different pattern. While hired labor accounted for nearly 16 percent of expenses on farms with sales of \$500,000 or more and 5 percent or less on farms with less than \$40,000 in sales, labor expenses were a fairly even portion of total expenses in each acre class. In fact, labor expenses, while differing little, were actually the largest portion of total expenses on both the smallest farms (those with less than 160 acres) and the largest (those with 1,000 acres or more).



Table 5—Weighted average cash expenses and capital expenditures by sales class, 1982

Item	Farms with sales of—										
	\$500,000 or more	\$250,000-\$499,999	\$200,000-\$249,999	\$100,000-\$199,999	\$50,000-\$99,999	\$40,000-\$49,999	\$25,000-\$39,999	\$20,000-\$24,999	\$10,000-\$19,999	\$2,500-\$9,999	Less than \$2,500
Cash operating expenses:											
Hired labor	150,990	25,984	15,094	7,555	3,091	2,844	1,639	1,106	609	380	139
Fertilizer and lime	49,958	24,285	18,129	11,541	6,021	4,278	3,170	2,432	1,594	729	316
Chemicals	30,204	10,627	6,329	3,983	1,962	1,503	1,030	689	457	131	61
Seed expense	26,453	11,008	7,612	4,621	2,513	2,126	1,438	965	613	272	142
Machinery repairs	27,622	10,287	8,387	5,022	3,180	2,319	1,835	1,152	890	456	273
Gas and oil	40,703	20,236	14,601	9,096	5,627	4,366	3,447	2,231	1,873	917	596
Custom hired work	3,917	1,552	1,330	1,410	839	659	599	590	413	153	91
Electricity and telephone	20,911	5,622	3,760	2,717	1,466	1,170	945	625	523	351	267
Building repairs	2,680	820	766	481	300	233	239	159	169	74	96
Livestock expense	17,416	6,242	3,831	3,159	1,547	951	780	537	389	298	243
Rent	32,117	12,845	8,936	5,845	2,799	1,615	1,721	652	474	171	96
Taxes	10,989	4,444	3,833	2,944	1,872	1,282	1,146	1,046	825	571	501
Insurance	12,330	5,578	3,858	2,792	1,809	1,350	1,059	818	646	397	313
Interest paid	93,479	40,199	23,955	15,732	9,129	5,813	4,809	2,916	2,085	1,294	1,260
Miscellaneous	40,186	8,928	6,301	3,934	2,208	1,648	1,139	1,006	697	383	269
Purchased feed	202,860	47,834	24,351	16,891	8,330	4,574	4,030	2,915	1,997	1,554	893
Purchased livestock	202,630	22,472	11,024	5,171	3,133	722	841	898	746	226	182
Total	965,445	258,963	162,097	102,894	55,826	37,453	29,867	20,737	15,000	8,357	5,738
Capital expenditures	91,102	49,878	29,160	19,059	12,703	8,490	8,893	4,015	4,280	3,555	3,557
Value of machinery and equipment:	386,160	225,190	178,000	119,300	76,204	59,688	48,727	30,299	27,514	15,431	11,846
Gains or losses from machinery and equipment sales	1,985	749	1,284	264	502	225	285	210	53	32	49

Table 6—Weighted average cash operating expenses and capital expenditures by acre class, 1982

Item	Acreage operated				
	Fewer than:	160 to	500 to	1,000 to	2,000
	160	499	999	1,999	and more
	<u>Dollars</u>				
Cash operating expenses:					
Hired labor	2,129	4,223	10,026	16,285	32,064
Fertilizer and lime	1,013	4,735	12,331	16,953	21,483
Chemicals	363	1,608	4,628	7,217	10,417
Seed expense	774	1,941	4,884	7,096	8,784
Machinery repairs	617	2,390	4,989	7,313	13,817
Gas and oil	1,388	4,093	9,105	13,712	21,500
Custom hired work	195	544	946	1,515	3,995
Electricity and telephone	636	1,308	2,321	4,057	7,006
Building repairs	162	312	386	503	748
Livestock expense	623	1,639	2,129	2,329	6,586
Rent	299	2,040	5,461	10,406	14,741
Taxes	696	1,493	2,636	3,064	6,047
Insurance	550	1,322	2,648	3,945	6,210
Interest paid	2,336	6,303	16,192	25,415	42,558
Miscellaneous	925	1,834	3,843	6,437	12,465
Purchased feed	6,461	11,903	14,322	15,030	24,041
Purchased livestock	810	4,065	14,334	12,065	50,298
Total	19,977	51,753	111,181	153,342	282,760
Capital expenditures	4,312	11,273	19,871	23,033	47,235
Value of machinery and equipment	19,134	60,438	120,440	152,260	213,950

Purchased livestock increased as a portion of expenses with each average size of farm, accounting for nearly a fifth of expenses on farms of 2,000 or more acres. Meanwhile, purchased feed expenses decreased as a portion of total expenses when farm size increased. On farms with fewer than 160 acres, purchased feed accounted for nearly a third of total expenses. Fertilizer, chemical, and seed expenses were a larger portion of total expenses on farms of 500 to 2,000 acres, which was consistent with the observation that farms of this size also received most of their receipts from crop sales.

Interest paid as a portion of total expenses also presents a considerably different perspective when viewed in terms of farm acreage instead of sales. Where interest paid accounted for about the same to a larger portion of total expenses on smaller farms in terms of sales, interest paid as a portion of expenses rose as farm acreage increased, peaking at nearly 17 percent of expenses on farms of 1,000 to 1,999 acres before falling to about 15 percent of expenses on farms of 2,000 or more acres. This result could occur because of the larger acreages operated (a part of which is likely financed), the larger amount of total operating expenses on large farms, or from the larger capital expenditures.

#### CAPITAL INTENSITY AND FINANCIAL PERFORMANCE

In table 7, some ratios and measures are shown based on capital intensity and farm performance derived from the mean estimates of acreage, investment, sales, and expenses presented for each sales class in tables 2, 3, and 5. A cash balance estimate, defined as total cash sources of income minus cash expenses, was also derived for each sales class. The cash balance estimates indicate that cash left to repay debt and reimburse the operators for their investment of labor, management, and capital ranged from \$188,655 on farms with sales of \$500,000 or more to a minus \$4,467 on farms with sales of less than \$2,500. Based on the survey data, each of the sales classes with less than \$20,000 in sales had a cash deficit.

Capital investment per acre, defined as the farm operator's value of all land operated plus the value of trucks, tractors, and other machinery divided by the number of acres operated, ranged from \$654 per acre on farms with sales of \$50,000 to \$99,999, to \$1,064 per acre on farms with less than \$2,500 in sales. The largest component of capital investment was land. The estimated value of land operated per acre, as of January 1, 1983, ranged from \$572 on farms of \$50,000 to \$99,999 in sales to \$966 per acre on farms with sales of \$250,000 to \$499,999. USDA reported the average value of land and buildings per acre at \$744 as of April 1, 1983, down from the year-earlier estimate of \$789 per acre.

Farms in the largest sales classes generated a substantially higher level of receipts and cash balance per acre than farms in the smaller sales class, probably because of the tendency of farms in the larger sales classes to obtain a large share



Table 7—Measures of capital intensity and financial performance, 1982

Item	Farms with sales of- -													
	: \$500,000 or more	: \$250,000- \$499,999	: \$200,000- \$249,999	: \$100,000- \$199,999	: \$50,000- \$99,999	: \$25,000- \$39,999	: \$20,000- \$24,999	: \$10,000- \$19,999	: \$2,500- \$9,999	: Less than \$2,500				
Cash balance (dollars/farm)	188,655.00	76,127.00	54,363.00	31,306.00	13,722.00	1,877.00	1,157.00	-691.00	-3,011.00	-4,467.00				
Capital per acre 1/	786.00	1,053.00	1,034.00	692.00	654.00	779.00	908.00	771.00	872.00	1,064.00				
Total receipts:														
Per acre	288.00	156.00	139.00	110.00	83.00	67.00	71.00	50.00	38.00	12.00				
Per dollar of capital	.37	.15	.13	.16	.13	.09	.08	.06	.04	.01				
Farm cash balance:														
Per acre	54.00	38.00	39.00	28.00	18.00	4.00	4.00	-3.00	-24.00	-55.00				
Per dollar of capital	.07	.04	.04	.04	.03	.01	.01	0	-.02	-.05				

1/ Excludes value of livestock herd; includes estimated value of land, trucks, tractors, and other machinery.

of receipts from livestock, fruits, vegetables, and other relatively high value crops. This may also result in the larger sales classes earning a higher level of cash balance per dollar of capital than smaller farms.

A MICRO-APPROACH  
TO FARM  
ACCOUNTING

Primary data, obtained through direct interviews with farm operators, can be used to help bring a more disaggregate perspective to farm accounting. Most farm economic data published in the Economic Indicators of the Farm Sector series cover the Nation, individual States, or economic class as measured by sales. The Census of Agriculture provides additional published data by farm type based on the SIC classification where farms are grouped according to the value of sales. Type of farm is determined by the source of sales, accounting for 50 percent or more of total sales.

Because of the heterogenous nature of sales classes, aggregate data are difficult to use in assessing how changes in input or output levels, price levels, technology, or policy changes may affect different types, sizes, locations, or ownership of farms. The survey data base being developed by ERS will help provide some of the flexibility needed to address these, as well as other research concerns related to farm production and economic well-being.

A primary constraint to use of the data for development of disaggregate indicators at present is one of sample size. A survey of 14,000 farmers will provide reliable national estimates. But, when the data are disaggregated to provide a more micro-perspective, the likelihood of thin data in a specific individual cell increases, which probably occurs in some of the data cells contained in tables 2 through 6 of this paper. Thus, once again, we stress that the data should be used only as a guide to farm characteristics. Plans, however, call for expanding sample size for future surveys. While not overcoming the problem of reliable population data, the new, expanded survey will provide sample data which can be used to develop a more disaggregated perspective, at least at the national level. This will greatly enhance research related to specific farm characteristics.

# Classification Criteria for Size and Type of Farm

R. Neal Peterson\*

Farm classification simplifies the description of the farm sector by reducing it to proportions that are amenable to analysis and understanding. Because of the changeable character of the farm sector, classification systems must be continually inspected and revised. This article reviews farm classification criteria and discusses how current economic developments and trends have affected their reliability.

The classification of U.S. agricultural activity began in 1850 when the first U.S. agricultural census for which a definition of "farm" was constructed: The returns of all farms or plantations, the produce of which amounts to \$100 in value, are to be included in this schedule; but it is not intended to include the returns of small lots, owned or worked by persons following mechanical or other pursuits, where the productions are not \$100 in value."<sup>1</sup>/ Such a definition created a dichotomous classification--a place was either a farm or not a farm--by establishing arbitrary limits on continually varying attributes, such as value of sales, acreage of land, and extent of other pursuits. The only other classification used in the 1850 Census was geographic region.

Classifications based on other attributes were regularly added to subsequent censuses, and existing classifications were redefined as agricultural conditions changed and the purposes of inquiry evolved. A partial list of the systems of classification introduced by the Census Bureau and the dates of introduction are as follows:

1850	Farm versus nonfarm; geographic region
1860	Size (area)
1880	Tenure
1900	Value of sales; principal source of income (commodity); color and race of operator
1920	Age of operator; years on farm
1925	Time spent in off-farm work
1950	Economic class (commercial versus noncommercial and incorporating value of sales)
1969	Form of business organization

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\* The author is an agricultural economist, Farm Sector Economics Branch, National Economics Division, ERS. The author wishes to thank David Harrington for his suggestions on this article. <sup>1</sup>/ U.S. Department of Commerce, Bureau of the Census, 1850 Census of Agriculture.



All of these systems of classification have had their definitions revised over the years. Notable revisions included those for farms, size classes, tenure arrangements, and values of sales classes. The contradiction inherent in making class interval distinctions on continually varying characteristics, such as acres, has prevented any classification of continuous variables from being entirely satisfactory, and thus has been a reason for revision. Another reason for revision is that relationships among different characteristics, although relatively stable over certain periods, have changed over time. For example, off-farm income, once associated mostly with small farms where operators either began or left farming, has become a more prevalent and stable component of the income of all farm families.

The choice of definitions for classification is especially important for time series analyses. The definitions that determine basic farm types and classes must rely on previous description and analysis and so inevitably lag behind the reality of the sector they attempt to describe. In periods of slow change the distortions introduced into analysis because of the lag in definition is slight, but in periods of rapid change, such as the past 50 years, lagging concepts and definitions can seriously distort the picture they are meant to draw. This distortion might not matter if the purpose of the classification were merely to describe the sector without explanation. But when classification serves the additional purposes of revealing relationships between variables, and of revealing change over time, the distortions can be serious.

To illustrate this distortion, consider the classification of farms by value of sales. Sales, a fundamental aspect of farm operations, varies greatly among farms, and affects and is affected by, other important economic financial measures, such as assets, debts, and income. Sales also measure farm size. From 1969 to 1978, the average physical size of farms increased about 7 percent from 389 acres to 415, while the average value of sales per farm increased 161 percent from \$16,689 to \$43,618. The question are: how much of this increase in sales resulted from a shift in the distribution of farms to larger sizes, and how much is due to inflation? Table 1 and figure 1 compare the distributions between the 2 years without correcting for inflation. The uncorrected distribution changed greatly at both the lower and upper ends of the distribution. The smallest class (less than \$2,500) decreased by 13 percent, and the combined two largest classes (sales greater than \$40,000) increased by nearly 16 percent.

The comparison is misleading, however, because the dollar, which is the unit of measure of sales, did not remain constant over the period. Inflation pushed farms of every size into larger sales classes. Precise retroactive adjustments for the effects of inflation on the distribution of farms to the various sales classes are impossible without access to individual farm records. However, an approximate correction may be derived by observing that during 1969-78 the index of

prices received by farmers nearly doubled from 107 to 210. And by fortuitous coincidence, the sales classes (for the most part) are defined in multiples, each class being double the value of the adjacent sales class below, allowing for easy adjustment. Farms that fell into a class of less than \$1,250 in 1969 would have fallen into a class of less than \$2,500 when computed in 1978 dollars. Farms that earned more than \$100,000 in sales in 1969 would have more than \$200,000 in sales in 1978 dollars. This adjustment cannot take into account changes in the quantity produced, the changing mix of enterprises on the farms, and the changing relative prices of commodities. But the reader may assume that these changes are mainly random in nature and tend to average out over the entire population of farms. In contrast to the uncorrected distribution, an inflation adjustment of the classes shows an amazingly constant distribution (fig. 2). The smallest classes (less than \$10,000, 1978 dollars) show hardly any change; the middle classes (\$10,000 to \$40,000) have shrunk a little; and the larger classes (greater than \$40,000) have correspondingly gained, especially those with sales of over \$100,000.

Although the value of sales is the most dramatic case of an unconstant definition of classes, other measures, such as tenure and type of farm, present similar problems. The type of farm, as characterized by the mix of commodities raised, is not constant, because farms have become more specialized. Although increasing specialization has reduced the arbitrariness of setting bounds on continuous variables, it has confounded trend analysis of farm sector structure and organization because the typical hog farm in 1980 was not the same typical hog farm of 1960. Soybean farms (by any definition) in the Mississippi Delta are distinctly different from soybean farms in Illinois because crops and crop rotations differ between the two States.

Tenure classification has changed greatly. Some different tenure classes used by the Census at different times have included such terms as full owner, part owner, tenant, cash rent, share rent, cash-share rent, manager, and owner-and-tenant. The classification used today is full owner, part owner, and tenant. The category of part owner has changed in character over the years. Although the mean ratio of land rented to land owned increased 12.2 percent from 1969 to 1978, the part owner classes in the 2 years are still called equivalent.

Classifications must reflect the prevailing relationships among the variables to achieve the purpose of simplifying the relationships among phenomena, which argues for revising classification criteria whenever significant new insights or changes occur. But, if one of the purposes of classification and description is to compare phenomena over time, then constant definitions of classes over time must be maintained.

Table 1--Comparison of sales class distribution, 1969 and 1978

	:	Farms with sales of--					
	:	Less than:\$2,500-	\$5,000-	\$10,000-	\$20,000-	\$40,000-	More than
Year	:	\$2,500	\$4,999	\$9,999	\$19,999	\$39,999	\$99,999 : \$100,000
	:	:	:	:	:	:	:
	:	<u>Percent</u>					
	:						
1978	:	24.7	13.4	13.4	12.5	12.3	14.7 9.0
	:						
1969	:	37.8	13.1	14.3	14.5	12.1	6.2 1.9
	:						

Figure 1

### Comparison of Sales Class Distribution Using Undeclared Definitions

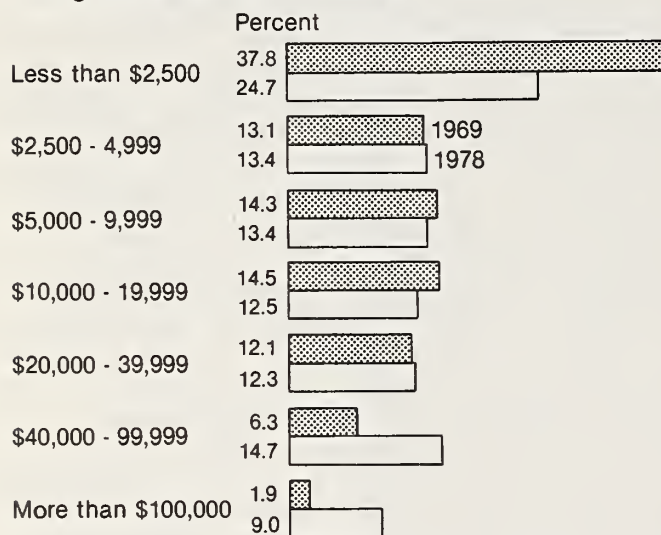
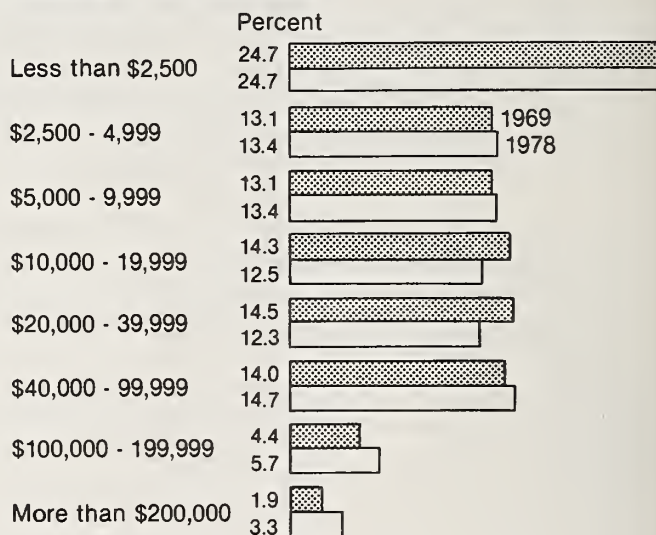


Figure 2

### Comparison Adjusted for Inflation Using Constant 1978 Dollars





# Analyzing Machinery Purchases and Sales by Producers According to Acreage Operated

Annette Clauson\*

In aggregate farm expense accounts, the total estimated economic depreciation has increased substantially since 1979. The calculated depreciation of tractors, trucks, and machinery and equipment constituted 17 percent of total production expenses in 1982. Motor vehicles and other machinery and equipment components made up 68 percent of total farm depreciation.

Estimated depreciation in the farm expense accounts is based on the value of the current machinery and equipment stocks plus a percentage of new capital expenditures. The estimated value of motor vehicles and other machinery on farms has gradually increased since 1979. According to Economic Indicators of the Farm Sector: Income and Balance Sheet Statistics, 1982, however, during 1979-82 the estimated capital expenditures on new equipment, minus trade-in allowance, decreased.

This article examines 1982 machinery expenses by types among producers in five different acreage classifications. The data used in this study were taken from the 1982 Farm Production Expenditure Survey (FPES), and with data from future surveys, are expected to help establish an improved data base for further evaluation of depreciation and capital asset relationships.

Farm operator data are collected by the Statistical Reporting Service in the annual FPES and includes expenditures for farm machinery, vehicles, and buildings. A farm or ranch is defined as any establishment producing agricultural commodities with annual sales of \$1,000 or more. Types of establishments included in the survey were those listed in the Federal Government Standard Industrial Code (SIC) for agricultural production of crops and livestock, major group codes 01 and 02. Because the characteristics of the group sampled were known, analysts used expansion factors to infer an estimated producer population. Aggregate and per-producer dollar amounts used in this article are estimates only, based on the almost 8,500 respondents surveyed. Estimated per-producer expenditures are discussed in the article, and the aggregate amounts are also provided in the tables for comparisons of total spending for machinery and equipment.

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\*Clauson is an agricultural economist, Economic Indicators and Statistics Branch, National Economics Division, ERS.

The total net farm share of expenditures (minus trade-in, rebate, or discount) is shown in table 1. Twenty-five percent or more of the per-producer machinery expenditures in each of the five acreage classes went toward the purchase of a first tractor. As expected, producers bought more second and third tractors on farms and ranches of more than 1,000 acres, than did producers on the smaller acreage classes.

Operators who farmed fewer than 160 acres spent 30 percent of their capital expenditures on the first purchase of a truck or pickup. Operators in the other four acreage categories spent between 11 and 14 percent of capital expenditures for the same purchase. Tillage machinery, a minor purchase for producers in each of the five acreage classes, accounted for 9 percent or less spent of per-producer funds. Expenses for planting, fertilizing, and chemical machinery were small for producers in all acreage categories, except for operators with 500 to 999 acres. Those operators spent about 10 percent of their total outlays for these items.

Harvesting machinery, especially self-propelled, was a major expense for operators in each of the acre classes over 160 acres, ranging from 17 to 25 percent of total machinery expenses. Haying machinery expenses ranged from 5 to 8 percent of total machinery expenditures. Other machinery and equipment spending ranged from 6 to 11 percent of the total machinery expenses. The survey data indicate that producers with fewer than 160 acres spent 36 percent of all capital expenditures on machinery and equipment. Farm or ranch operators working 160 to 499 acres spent 47 percent; 500 to 999 acres, 53 percent; 1,000 to 1,999 acres, 64 percent; and 2,000 acres and up, 40 percent. More information about the types of farms operated in each of the five acre classes appears in tables 2 and 3. Per-producer spending on machinery by crop farm operators in each of the five acre classes, excluding those operators listed primarily as livestock operators, are shown in table 2. Per-producer spending was higher for operators in each of the five crop farm acreage classes in 1982 compared with all operators in crop and livestock combined (see table 1), indicating that producers operating crop farms spent more on the listed machinery categories than did producers operating combined, or primarily, livestock farms.

Although crop producers working fewer than 160 acres still spent over 60 percent of their funds on tractors, trucks, and pickups, producers in each of the other acre classes spent less than half of their funds on similar capital items. Expenditures on large machinery items increased for crop farm operators with more than 160 acres. Larger operators spent 9 percent of their capital expenditures on tillage machinery. Crop farm producers operating 500 to 999 acres spent 12 percent of their per-producer dollars on planting, fertilizing, and chemical machinery. Self-propelled harvesting machinery was a large expense item for operators in each of the four largest acre classes, from 15 percent for operators

Table 1—Total machinery expenses and sales, by acre class, 1982

Item	: Fewer than 160 acres :				: 160 to 499 acres :				: 500 to 999 acres :				: 1,000 to 1,999 acres :				: 2,000 acres and above :			
	Total	: per : producer :	Total	: per : producer :	Average : : per : producer :	Total	: per : producer :	Average : : per : producer :	Total	: per : producer :	Average : : per : producer :	Total	: per : producer :	Average : : per : producer :	Total	: per : producer :	Average : : per : producer :	Total	: per : producer :	Average : : per : producer :
	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars
First tractor purchased	400.3	486	731.0	1,448	533.0	2,895	354.4	3,670	366.9	5,213										
Second tractor purchased	9.8	12	46.1	91	39.7	215	31.2	323	58.5	832										
Third tractor purchased	.2	0	4.3	9	.6	.3	4.5	46	4.0	57										
Other vehicles 1/	60.5	73	68.4	136	41.1	223	13.5	140	17.5	249										
Tillage machinery (other) 2/	58.7	71	191.2	379	180.8	982	100.0	1,036	107.0	1,520										
Planting, fertilizing, and chemical: machinery (self-propelled) 3/	2.0	2	2.6	5	18.9	103	33.6	348	6.4	91										
Planting, fertilizing, and chemical: machinery (other) 3/	59.7	73	149.0	295	178.0	967	79.1	819	65.4	929										
Harvesting machinery	30.1	37	343.3	680	267.5	1,453	299.3	3,100	231.5	3,290										
(self-propelled) 4/																				
Harvesting machinery (other) 4/	25.3	31	194.3	385	59.2	322	57.9	600	11.4	162										
Haying machinery	10.1	12	20.0	40	17.9	97	26.0	269	21.4	305										
(self-propelled) 5/																				
Haying machinery (other) 5/	98.6	120	194.3	385	121.3	659	48.8	505	45.1	641										
Other machinery and equipment	11.8	14	67.3	133	17.2	93	68.0	704	17.2	245										
(self-propelled) 6/																				
Other machinery and equipment (other) 6/	95.1	115	223.1	442	154.6	840	70.6	731	63.5	902										
First truck or pickup purchased	382.4	464	355.3	704	227.2	1,234	155.1	1,606	202.5	2,877										
Second truck or pickup purchased	13.4	16	17.9	35	25.8	140	16.5	171	38.8	551										
Third truck or pickup purchased	1.7	2	.7	1	5.0	27	1.7	18	7.3	104										
Rent or lease of machinery	27.8	34	75.2	149	47.2	256	64.0	663	69.1	982										
Total machinery expenses	1,288	1,562	2,684	5,317	1,935	10,509	1,424	14,749	1,334	18,950										
Sales of motor vehicles																				
used for farming 7/	150.1	182	115.4	229	64.9	353	39.8	412	55.9	795										

1/ Includes garden tractors, snowmobiles, motorcycles, skid loaders, airplanes, or other special vehicles.

2/ Includes plows, disk harrows, cultivators, rotary hoes, subsoilers, and scrapers.

3/ Includes grain drills, planters, listers, spreaders, sprayers, dusters, and any other crop pesticide application machinery.

4/ Includes combines, forage harvesters, pickers, diggers, cutters, and shakers.

5/ Includes windrowers, swathers, mowers, rotary cutters, shredders, rakes, conditioners, crimpers, crushers, balers, and loaders.

6/ Includes wagons, trailers, feed grinding and mixing equipment, blowers, elevators, silo unloaders, loaders, posthole diggers, standby electric equipment, crop dryers and equipment, electric motors, and gasoline engines.

7/ Includes tractors, combines, farm machinery, equipment, and supplies.



Table 2—Crop farms, machinery expenses, and sales, by acre class, 1982

Item	: Fewer than 160 acres :						: 160 to 499 acres :						: 500 to 999 acres :						: 1,000 to 1,999 acres :						: 2,000 acres and above :					
	: Total :		: Average :		: per :		: Total :		: Average :		: per :		: Total :		: Average :		: per :		: Total :		: Average :		: per :		: Total :		: Average :		: per :	
	: producer :		: producer :		: producer :		: producer :		: producer :		: producer :		: producer :		: producer :		: producer :		: producer :		: producer :		: producer :		: producer :		: producer :		: producer :	
	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars
First tractor purchased	226.0	546	378.1	1,505	344.1	3,011	282.0	4,421	300.9	8,839																				
Second tractor purchased	8.1	19	15.7	62	33.6	294	19.7	308	51.7	1,520																				
Third tractor purchased	0	0	3.6	14	.1	0	4.4	69	3.6	105																				
Other vehicles 1/	30.3	73	38.8	155	12.4	108	6.0	95	11.1	326																				
Tillage machinery (other) 2/	37.2	90	129.3	515	118.1	1,033	72.7	1,139	90.4	2,655																				
Planting, fertilizing, and chemical: machinery (self-propelled) 3/	1.8	4	.7	3	18.5	162	33.6	526	6.1	180																				
Planting, fertilizing, and chemical: machinery (other) 3/	39.5	95	78.6	313	137.9	1,206	65.5	1,027	56.6	1,663																				
Harvesting machinery (self-propelled) 4/	21.0	51	220.1	876	183.9	1,609	271.3	4,252	196.9	5,783																				
Harvesting machinery (other) 4/	7.5	18	120.1	478	42.8	375	44.4	697	9.1	268																				
Haying machinery (self-propelled) 5/	7.7	19	11.6	46	8.1	71	8.5	134	4.9	143																				
Haying machinery (other) 5/	27.8	67	57.5	229	71.2	623	25.1	394	23.0	676																				
Other machinery and equipment (self-propelled) 6/	7.4	18	13.0	52	8.1	71	67.6	1,059	13.4	394																				
Other machinery and equipment (other) 6/	37.5	91	69.9	278	83.7	732	39.3	616	47.0	1,380																				
First truck or pickup purchased	197.7	478	178.4	710	148.7	1,301	98.1	1,538	122.2	3,591																				
Second truck or pickup purchased	7.0	17	10.5	42	20.7	181	11.3	177	23.5	690																				
Third truck or pickup purchased	1.3	3	.7	3	3.3	29	1.1	18	5.0	147																				
Rent or lease of machinery	19.2	46	37.9	151	32.3	282	50.7	795	59.2	1,741																				
Total machinery expenses	677	1,635	1,365	5,432	1,268	11,088	1,101	17,265	1,025	30,101																				
Sales of motor vehicles used for farming 7/	112.2	271	86.0	342	36.4	318	37.9	595	45.8	1,345																				

1/ Includes garden tractors, snowmobiles, motorcycles, skid loaders, airplanes, or other special vehicles.

2/ Includes plows, disk harrows, cultivators, rotary hoes, subsoilers, and scrapers.

3/ Includes grain drills, planters, listers, spreaders, sprayers, dusters, and any other crop pesticide application machinery.

4/ Includes combines, forage harvesters, pickers, diggers, cutters, and shakers.

5/ Includes windrowers, swathers, mowers, rotary cutters, shredders, rakes, conditioners, crumbers, balers, and loaders.

6/ Includes wagons, trailers, feed grinding and mixing equipment, blowers, elevators, silo unloaders, loaders, posthole diggers, standby electric equipment, crop dryers and equipment, electric motors, and gasoline engines.

7/ Includes tractors, combines, farm machinery, equipment, and supplies.

Table 3—Livestock farm, machinery expenses and sales, by acre class, 1982

Item	: Fewer than 160 acres :						: 160 to 499 acres :						: 500 to 999 acres :						: 1,000 to 1,999 acres :						: 2,000 acres and above :					
	Total	: Average : : per : : producer :	Total	: Average : : per : : producer :	Total	: Average : : per : : producer :	Total	: Average : : per : : producer :	Total	: Average : : per : : producer :	Total	: Average : : per : : producer :	Total	: Average : : per : : producer :	Total	: Average : : per : : producer :	Total	: Average : : per : : producer :	Total	: Average : : per : : producer :	Total	: Average : : per : : producer :	Total	: Average : : per : : producer :	Total	: Average : : per : : producer :	Total	: Average : : per : : producer :		
	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars	Million dollars	Dollars
First tractor purchased	174.3	425	352.9	1,391	188.9	2,706	72.3	2,208	66.1	1,818																				
Second tractor purchased	1.7	4	30.5	120	6.1	87	11.5	351	6.8	187																				
Third tractor purchased	.2	0	.7	3	.5	7	0	2	.4	12																				
Other vehicles 1/	30.2	74	29.6	117	28.7	411	7.5	228	6.4	176																				
Tillage machinery (other) 2/	21.5	52	61.9	244	62.7	899	27.4	836	16.6	458																				
Planting, fertilizing, and chemical: machinery (self-propelled) 3/	.2	0	1.9	7	.4	6	0	0	.2	7																				
Planting, fertilizing, and chemical: machinery (other) 3/	20.2	49	70.4	277	40.1	574	13.6	415	8.7	241																				
Harvesting machinery	9.1	22	123.2	485	83.6	1,197	28.0	856	34.7	954																				
(self-propelled) 4/																														
Harvesting machinery (other) 4/	17.8	43	74.3	293	16.4	235	13.5	411	2.3	63																				
Haying machinery	2.4	6	8.5	33	9.8	140	17.5	533	16.6	456																				
(self-propelled) 5/																														
Haying machinery (other) 5/	70.8	173	136.8	539	50.1	717	23.6	721	22.1	608																				
Other machinery and equipment	4.5	11	54.3	214	9.1	130	.4	13	3.8	104																				
(self-propelled) 6/																														
Other machinery and equipment	57.6	141	153.2	604	70.9	1,016	31.3	955	16.5	454																				
(other) 6/																														
First truck or pickup purchased	184.7	450	177.0	697	78.4	1,124	57.0	1,739	80.3	2,209																				
Second truck or pickup purchased	6.4	16	7.4	29	5.1	73	5.1	157	15.3	422																				
Third truck or pickup purchased	.4	1	0	0	1.7	24	.6	17	2.3	64																				
Rent or lease of machinery	8.7	21	37.3	147	14.9	214	13.3	406	9.8	271																				
Total machinery expenses	611	1,488	1,320	5,200	667	9,560	323	9,848	309	8,504																				
Sales of motor vehicles	37.8	92	29.4	116	28.5	409	1.8	56	10.1	279																				
used for farming 7/																														

1/ Includes garden tractors, snowmobiles, motorcycles, skid loaders, airplanes, or other special vehicles.

2/ Includes plows, disk harrows, cultivators, rotary hoes, subsoilers, and scrapers.

3/ Includes grain drills, planters, listers, spreaders, sprayers, dusters, and any other crop pesticide application machinery.

4/ Includes combines, forage harvesters, pickers, diggers, cutters, and shakers.

5/ Includes windrowers, swathers, mowers, rotary cutters, shredders, rakes, conditioners, crimpers, crushers, balers, and loaders.

6/ Includes wagons, trailers, feed grinding and mixing equipment, blowers, elevators, silo unloaders, loaders, posthole diggers, standby electric equipment, crop dryers and equipment, electric motors, and gasoline engines.

7/ Includes tractors, combines, farm machinery, equipment, and supplies.

of 500 to 999 acres to 25 percent for operators of 1,000 to 1,999 acres.

Acreage class size by itself does not always determine the percentage of capital spent on each machinery item. For example, purchases of motor vehicles used for farming were 17 percent of machinery expenditures for crop producers operating fewer than 160 acres. Crop producers in the remaining four acreage classes averaged only 3 to 6 percent of the total machinery expenditures for motor vehicles used for farming.

Dollars spent per producer on machinery by livestock farm operators in each of the five acre classes are shown in table 3. Per-producer spending for machinery ranged lower for operators in each of the five livestock farm acreage classes than for crop operators (table 3). Producers who operated livestock farms also spent a smaller percentage of their total capital expenditures on machinery than did crop farm producers.

Producers working fewer than 160 acres and 2,000 or more acres allocated the largest percentage of their spending, 60 and 55 percent, respectively, toward tractors, trucks, and pickups. Producers in the three other classes, 160 to 1,999 acres in all, spent less than 45 percent of their per-producer funds on tractors, trucks, and pickups. Producers from the middle acreage classes spent a larger percentage of their machinery dollars on tillage, planting, fertilizing, and chemical, harvesting, and haying machinery. Purchases of farm motor vehicles were a small percentage of total machinery expenditures, ranging from 1 to 6 percent for livestock operators.

Tractors, trucks, and pickups were major capital expense items for operators in all of the acreage classes. While all farm disaggregation showed some general information in machinery purchased, further disaggregation by crop farms and livestock farms showed clearer breakdowns of machinery purchases for certain items. The data indicated that per-producer total expenditures for machinery were lower for operators in each of the five livestock farm acreage classes than for crop operators. Further disaggregation of the data using other SIC codes should be considered and included in future analysis of machinery expenditures. The disaggregation and analysis of machinery expenditures into acreage classes operated by producers of crop and livestock farms will provide a basis for a better understanding of the distribution of economic depreciation and the reasons for changes in the aggregate estimated value. The economic implications and relationships of economic depreciation to type and size of farm and current income position are an area for additional research.



# Size Characteristics and Spending Patterns for Corn Belt Grain Farms in 1982, from the Farm Production Expenditure Survey

Richard Prescott\*  
Kenneth Baum

This article demonstrates the use of 1982 Farm Production Expenditure Survey (FPES) data on farm expenses and capital outlays by farm size for cash grain farms in the U.S. Corn Belt. Acreage harvested and gross value of sales define farm size. This article concludes that FPES data can provide estimates of expenses by category, size, and type of farm. However, given the limited number of farm observations used in this analysis, variation of many detailed expense categories is so large that average differences among size categories may not be significant.

The FPES measures U.S. farm expenses, not, strictly speaking, economic costs. The FPES provides no direct information on the value of the labor of the farm operator and family, the opportunity cost of land and capital, or capital depreciation. Nevertheless, the distribution of per-acre farm production expenses is of interest because of the information shed on input usage and the partial view of actual operating costs.

FPES data are important for three reasons. First, the FPES is a national farm sector survey conducted annually by the Economic Research Service (ERS) and Statistical Reporting Service (SRS) and is the only national source of establishment data comprehensive enough to analyze farm expenses and returns by region, size, and type of farm. FPES data contain specific location, acreage, returns, and expense data by individual operating unit. Second, FPES data are obtained through a probability sample where each farm operation is selected with a known probability. A probability sample is necessary if statistical properties of the data are to be estimated or are of analytical value to the research. Standard error estimates may be constructed for various measures of farm expenses, although specialized computational procedures must be followed. Third, because the FPES is done on an annual basis, data from this survey can be correlated with current events or used to update specific economic indicators.

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\*Prescott is an agricultural economist and Baum is leader, Farm Expense and Productivity Section, Economic Indicators Branch, National Economics Division, ERS. The authors thank Larry Salathe, Milton Ericksen, and Lyle Schertz for their helpful reviews.

An example would include updating aggregate estimates of farm expenses as well as disaggregated estimates by region, size, and type of farm. Only benchmark estimates obtained from the Census of Agriculture are available to estimate whole farm expenses by size, type, and geographic region. Because the FPES data base also contains specific location, acreage, returns, and expense item data, detailed analytical descriptive analyses of the farm sector are conceptually possible. However, the authors felt that empirical evidence is needed both to demonstrate possible quantitative problems and to pinpoint the survey's analytical potential.

#### DEFINITION OF FARM TYPES

In this analysis, the Census's Standard Industrial Classification (SIC) series was the initial criteria used to classify farms into a 3-digit industry group which is an amalgam of the Census's SIC 4-digit industries. A farm's placement in a particular 4-digit industry depends on the enterprise from which it derives 50 percent or more of its gross receipts. The farm type examined here, cash grain farms (SIC group 011), contains five industries: wheat, rice, corn, soybeans, and cash grain farms not elsewhere classified. The authors screened a sample of 466 cash grain farms from 1,215 Corn Belt farms in the FPES sample. The States included in the Corn Belt are Iowa, Indiana, Missouri, Illinois, and Ohio.

Two problems should be recognized whenever analyzing farms by SIC code. First, farms change industries when they change enterprise mix or when relative prices change over time. Any interyear analysis must take into account the possibility that the units of observation are not constant. For a single-year cross-sectional analysis (which is how the FPES is used here), this is not a problem because all farms are measured during the same time period. The second problem relates to a composition problem, such as the assumption that farms within a class are of a similar type when actually farms in an industry group may have dissimilar enterprise mixtures. An analysis of whole farm costs by size of farm can be misleading if enterprise mix changes with farm size, particularly if the sample size is relatively small.

Farm size is the other classification variable used in this analysis. The first farm size definition uses harvested acreage with four acreage size classes: fewer than 180, 180 to 499, 500 to 999, and 1,000 acres and above (table 1). These size categories are aggregations of categories used in the 1978 Census of Agriculture. A second size variable used is value of gross sales with 6 sales class groups based on aggregations of 11 sales class definitions approved by the Office of Management and Budget. Originally, seven groups were used, but the smallest class (farms with sales of less than \$2,500) had very few observations and was included with the next largest sales group.

The difficulties encountered when trying to classify farms by size revolve around a cross-classification of the 466 cash grain farms in the Corn Belt based on information gathered



Table 1--A cross-classification of 466 cash grain farms in the Corn Belt, 1982 <sup>1/</sup>

Value of sales	Unit	Acreage harvested				Total acres
		1,000 or more acres	500 to 999 acres	180 to 499 acres	Fewer than 180 acres	
\$25,000 or more:						
Farms <sup>2/</sup>	No.	50	13	1	0	64
Total farms <sup>3/</sup>	Pct.	10.73	2.79	.21	0	13.73
Farms by sales class <sup>4/</sup>	Do.	78.13	20.31	1.56	0	100.00
Farms by acreage class <sup>5/</sup>	Do.	69.44	16.05	.65	0	N/A
\$100,000-\$249,999:						
Farms	No.	21	52	21	0	94
Total farms	Pct.	4.51	11.16	4.51	0	20.17
Farms by sales class	Do.	22.34	55.32	22.34	0	100.00
Farms by acreage class	Do.	29.17	64.20	13.55	0	N/A
\$50,000-\$99,999:						
Farms	No.	1	12	76	7	96
Total farms	Pct.	.21	2.58	16.31	1.50	20.60
Farms by sales class	Do.	1.04	12.50	79.17	7.29	100.00
Farms by acreage class	Do.	1.39	14.81	49.03	4.43	N/A
\$25,000-\$49,999:						
Farms	No.	0	3	40	40	83
Total farms	Pct.	0	.64	8.58	8.58	17.81
Farms by sales class	Do.	0	3.61	48.19	48.19	100.00
Farms by acreage class	Do.	0	3.70	25.81	25.32	N/A
\$10,000-\$24,999:						
Farms	No.	0	1	15	56	72
Total farms	Pct.	0	.21	3.22	12.02	15.45
Farms by sales class	Do.	0	1.39	20.83	77.78	100.00
Farms by acreage class	Do.	0	1.23	9.68	35.44	N/A
Less than \$10,000:						
Farms	No.	0	0	2	55	57
Total farms	Pct.	0	0	.43	11.80	12.23
Farms by sales class	Do.	0	0	3.51	96.49	100.00
Farms by acreage class	Do.	0	0	1.29	34.81	N/A
Total:						
Farms	No.	72	81	155	158	466
Total farms	Pct.	15.45	17.38	33.26	33.91	100.00
Farms by sales class	Do.	N/A	N/A	N/A	N/A	100.00
Farms by acreage class	Do.	100.00	100.00	100.00	100.00	100.00

N/A = not applicable.

<sup>1/</sup> Data taken from the 1982 Farm Production Expenditure Survey; the Corn Belt includes Iowa, Illinois, Indiana, Missouri, and Ohio.<sup>2/</sup> Number of farms in each acreage and sales class.<sup>3/</sup> Percentage of total farms accounted for by each acreage and sales class.<sup>4/</sup> Percentage of total farms in the sales class.<sup>5/</sup> Percentage of total farms in the acreage class.



in the 1982 FPES. The distribution of farms among income classes was fairly uniform, as expected, given the sampling objectives of the FPES. However, the distribution among acreage classes was sharply skewed to the smaller farms, again reflecting the much larger number of small (in terms of acreage) farms in the Corn Belt.

In the two largest acreage categories, only about two-thirds of these farmers had sales of over \$250,000, or between \$100,000 and \$249,999. Of farms with fewer than 180 acres, income fell almost equally among the three smallest sales classes. Farms having 180 to 499 acres also showed a more dispersed distribution in the three sales class categories between \$25,000 to \$249,999, although about half were in the third size category, \$50,000 to \$99,000.

Use of the six sales classes resulted in a more uniform size distribution than did the four acreage size classes, except the second sales class, \$100,000 to \$249,999. For farms with sales of less than \$100,000, 111, or over 85 percent, had fewer than 180 acres. Of the 158 farms with over \$100,000 in sales, only 22, or 14 percent, had less than 500 acres.

The cross-classification of the two size variables generally confirms that cash grain farms' gross sales are directly related to harvested acres, particularly for farms in larger sales classes. Although both size classification criteria seem consistent, the distribution of farm expenses by farm size is not totally consistent across the two size variables.

#### VARIABILITY OF OPERATING CHARACTERISTICS

Differences in operating characteristics by size of farm can affect expense patterns if the mix of crop and livestock activities vary with farm size. Operating characteristics were estimated for both acreage and sales class sizes and on a whole farm and per-acre basis (tables 2 and 3).

Examination of operating characteristics by acreage class shows that corn, small grain, and soybean acreages grow, as expected, in absolute levels as acreage size increases (table 2). But on a per-harvested-acre basis, only the corn acreage share increased until the largest size class was reached. On farms with over 1,000 acres, the corn acreage share decreased markedly, primarily because of the inclusion of several large rice farms in Missouri. The number of peak hired workers per farm increased, as expected, when farm acreage increased, but their use per acre decreased noticeably, signifying that workers were likely being used less intensively on larger farms under either size classification.

More efficient use of farm machinery evidently occurred on larger acreage cash grain farms. The value per acre of tractors declined fairly consistently from \$89 to \$64 when farm size grew to over 5,000 acres; all other farm machinery fell from \$143 to \$119 per acre from moderate to the largest size operations. While the value per farm of operated land approximately doubled in each acreage class, land values per

Table 2--Selected 1982 operating characteristics of 466 cash grain farms in the Corn Belt, by acreage class, on a per-farm and per-acre basis

[illegible]

-- = Less than 0.005.

Table 3--Selected 1982 operating characteristics of 466 cash grain in  
Corn Belt, by sales class

Item	\$0 to \$9,999			\$10,000 to \$24,999			\$25,000 to \$49,999			\$50,000 to \$99,999			\$100,000 to \$249,999			More than \$250,000		
	Acres per farm	Percent of total	Percent of average	Acres per farm	Percent of total	Percent of average	Acres per farm	Percent of total	Percent of average	Acres per farm	Percent of total	Percent of average	Acres per farm	Percent of total	Percent of average	Acres per farm	Percent of total	Percent of average
Acres harvested:	Acres	Percent	Percent	Acres	Percent	Percent	Acres	Percent	Percent	Acres	Percent	Percent	Acres	Percent	Percent	Acres	Percent	Percent
Corn	18	0.31	0.35	49	0.35	0.45	93	0.45	0.45	168	0.47	.43	297	.43	.43	514	.38	.38
Small grains	7	.12	.11	15	.11	.09	17	.09	.09	23	.06	.11	77	.11	.11	87	.06	.06
Soybeans	29	.50	.43	60	.43	.39	81	.39	.39	146	.41	.43	293	.43	.43	563	.42	.42
Hay	4	.07	.09	13	.09	.06	13	.06	.06	14	.04	.01	10	.01	.01	9	.01	.01
Sorghum	--	--	.01	1	.01	--	--	--	--	--	--	--	1	--	--	72	.05	.05
Cotton	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--
Tobacco	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Rice	--	--	--	--	--	.01	1	.01	.01	--	--	--	1	--	--	15	.07	.07
Other crops	--	--	.01	2	.01	--	1	--	--	4	.01	.01	5	.01	.01	12	.01	.01
Acres:	Acres	Percent	Percent	Acres	Percent	Percent	Acres	Percent	Percent	Acres	Percent	Percent	Acres	Percent	Percent	Acres	Percent	Percent
Cash rented	3	.05	.07	10	.07	.14	28	.14	.14	44	.13	.16	112	.16	.16	257	.19	.19
Share rented	27	.46	.53	74	.53	.50	103	.50	.50	159	.45	.44	299	.44	.44	584	.43	.43
Rented	30	.51	.60	84	.60	.63	131	.63	.63	203	.57	.60	410	.60	.60	841	.62	.62
Peak hired workers	3	.005	.006	.8	.006	.007	1.4	.007	.007	1.5	.004	.003	2.0	.003	.003	3.1	.002	.002
Value of land and machinery:	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre
Operated	110,384	1,917	240,025	1,717	416,638	2,020	416,638	2,020	2,020	665,726	1,877	1,944	1,329,149	1,944	1,944	2,681,344	2,681,344	2,681,344
Land	1,733	30	3,915	28	5,110	25	5,110	25	25	7,135	20	23	15,719	23	23	33,083	33,083	33,083
Trucks	5,152	89	12,069	86	20,386	99	20,386	99	99	29,692	84	75	51,578	75	75	88,065	88,065	88,065
All other farm machinery	5,136	89	16,987	122	34,003	165	34,003	165	165	44,409	125	133	91,154	133	133	144,175	144,175	144,175
Cash receipts:	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre	Dollars/acre
Cattle	236	5	1,376	10	2,687	13	2,687	13	13	5,397	15	13	8,788	13	13	8,139	8,139	8,139
Hogs	55	1	944	7	867	4	867	4	4	2,844	8	10	6,957	10	10	11,680	11,680	11,680
Poultry	--	--	108	1	3	--	3	--	--	1	--	--	--	--	--	--	--	--
Cash grains	4,646	81	14,789	106	33,093	160	33,093	160	160	62,371	176	196	134,348	196	196	340,558	340,558	340,558
Milk	--	--	--	--	46	--	46	--	--	126	--	1	471	1	1	411	411	411

-- = Less than 0.005.



acre declined irregularly under an acreage classification. The 180-to-499 and 500-to-999 acreage classes showed the highest proportion of share-rented land, but the operators of the largest farms apparently preferred to cash rent relative to smaller farms.

An analysis of operating characteristics by sales class of these same cash grain farms was performed to check the trends noticed under the acreage classification (table 3). For example, acres harvested of corn, small grains, and soybeans increased as sales class size increased. The relative amount of corn acreage, though, increased as sales class increased through \$50,000 to \$99,000 but declined thereafter. The percentage of small grains acreage decreased gradually, except in the \$100,000 to \$249,000 category. Relative soybean acreage first declined with increased sales size, then leveled off or increased at \$50,000 in sales and above. As with the acreage classification, acreages of other crops were small in all farm sizes, except some crop diversity began to appear as farms exceeded \$250,000 in sales. These results correspond to the widely held view that larger farms act to reduce risk by decreasing crop specialization, or else have less homogeneous resources because of size.

The number of peak hired workers increases as sales class size increases, but larger farms, defined by either sales or acreage categories, use these workers in smaller amounts per harvested acre. Unlike the results of the acreage classification, the value per acre of operated land was fairly constant across all sales classes, ranging from a low of \$1,717 to a high of \$2,020. The value of all types of farm machinery increased per farm through the size categories. The value of trucks per acre decreased across most categories, but the value of tractors per acre fell sharply after \$50,000 in sales was reached. In the bottom three categories, tractor value per acre averaged around \$90, but this simple average fell to \$70, a decrease of over 20 percent, for farms with sales over \$100,000. The value of all other machinery per acre increased from \$89 on the smallest farms to \$165 on farms with \$25,000 to \$49,999 in sales and then fell by about a third to \$107 for the largest farms. These trends are similar to those shown when farms were classified by acreage.

In both classifications, revenue per farm from sales of livestock increased steadily over the sales class categories as did revenue per acre from cash grains. However, on a per-harvested-acre basis, midsize farms relied more heavily on livestock enterprises than did the smallest or largest farms. Cash grain revenue differences among sales classes were far more apparent than for the acreage categories. There was a trend toward cash-rented acreage as a percent of total harvested acreage when sales increased. This share reached 19 percent in the largest category. The proportion of share-rented land, however, was fairly even through most of the sales classes, unlike the acreage classification. The percent of land share rented ranged from 43 to 53 percent with the lower percentages in the larger sales classes.

PER-ACRE EXPENSES  
BY SIZE OF FARM

Per-acre expenses for farm operators, by size of farm, using the acreage and sales classifications appear in tables 4 and 5. This phase of the analysis measured input expenses by size of farm and identified how they changed with farm size. A coefficient of variation was estimated for each item in each size class to show the relative precision of each expense statistic.

The coefficient of variation is the ratio of the standard deviation to the mean and is expressed as a percentage. It is a better measure of relative variability than the measure of the absolute variability, the standard deviation. The estimated coefficient of variation for most of the individual cost items is above 0.1 to 0.15, so use of these per-acre cost estimates to identify specific economies of farm size is tentative because of the data set used in this research analysis.

Expenses are divided into three categories: variable, fixed, and capital outlays. Capital outlays are total obligations for new capital stock which either replace existing capital or become additions to the capital stock. The expense figures shown are those incurred only by farm operators. Landlord expenses are not included. Separate FPES data for farm operators and landlords are available but were not used in this report because of various computational problems. Because expenditure patterns may vary by farm size, type, region, and tenure arrangement, the lack of landlord data limits the conclusions of this analysis. The reported figures may be biased because the extent of share renting changes with farm size.

Total per-acre expenses and outlays by acreage size class were approximately \$240 for the two smallest classes, rose slightly to \$244 for the 500-to-999 acre class, and fell to \$234 per acre for the largest farms. Ranked from the smallest to largest size class, variable expenses were 60, 66, 71, and 67 percent of the total expenses and outlays of the four acreage classes. Total variable expenses per acre rose from \$145 for the smallest size class to a high of \$175 for the 500-to-999-acres size class and then declined to \$156 per acre for the largest size group. Fixed expenses were 25, 16, 18, and 23 percent of total expenses and outlays for the four size categories. Total per-acre fixed expenses showed an erratic pattern with expenses declining and then increasing for larger farms. Capital outlays for the four size classes were 15, 17, 11, and 10 percent of total expenses and outlays. Per-acre outlays rose from \$35 to \$40 for the two smallest size classes and then fell sharply to \$26 and \$24 per acre for the two largest farm size categories, respectively.

For the first three size classes, rent (cash and value of share), fertilizer, and fuel and lubrication for machinery operations were the largest components of total variable expenses. These three components constituted 54, 61, and 67 percent of total variable expenses for the first three size

Table 4--1982 Per-acre whole farm expenses for cash grain farms in the Corn Belt, by acreage size class 1/

Item	Acreage harvested			
	Fewer than 179 acres	180 to 499 acres	500 to 999 acres	More than 1,000 acres
Variable expenses:	Dollars			
Rent:				
Cash rent	7.56 (28.5)	10.64 (21.9)	10.38 (25.2)	16.74 (21.9)
Value of share rent	23.22 (19.8)	47.34 (10.6)	65.41 (13.8)	37.36 (15.1)
Seed	12.94 (4.2)	10.70 (7.9)	10.63 (6.0)	11.69 (9.2)
Fertilizer	28.94 (5.7)	25.37 (6.0)	29.67 (6.7)	27.00 (9.2)
Lime and soil conditioners	.87 (26.9)	.47 (32.9)	1.05 (37.3)	.53 (40.1)
Pesticides	9.72 (9.2)	8.56 (8.4)	9.16 (13.9)	7.09 (17.5)
Custom operations:				
Planting	.66 (34.9)	.32 (39.4)	.41 (87.2)	.02 (70.2)
Harvesting	4.93 (15.2)	3.28 (19.0)	1.14 (51.4)	.51 (41.1)
Livestock and poultry purchases	4.10 (23.2)	5.97 (23.2)	7.71 (36.0)	1.92 (46.1)
Feed	5.97 (17.3)	8.09 (18.9)	5.02 (25.7)	3.08 (35.2)
Livestock and poultry equipment and supplies	1.09 (14.7)	1.14 (11.8)	.94 (20.6)	.28 (31.7)
Hired labor:				
Cash wage	3.00 (34.0)	2.78 (20.9)	3.49 (17.8)	14.45 (16.9)
Fringe benefits	.12 (79.2)	.40 (39.6)	.28 (31.5)	2.37 (20.6)
Fuel and lubrication:				
Machinery operations	18.63 (5.3)	15.04 (3.7)	12.11 (4.6)	13.94 (4.7)
Drying and other	1.39 (27.9)	2.66 (12.1)	1.98 (17.6)	2.33 (13.2)
Farm and motor supplies	13.87 (8.5)	12.08 (9.6)	9.50 (7.5)	10.18 (12.1)
Farm marketing and storage	2.64 (36.8)	1.79 (24.3)	2.04 (26.2)	2.49 (25.5)
Maintenance and repair:				
Land	.12 (28.6)	.58 (33.3)	.28 (49.0)	.44 (53.5)
Farm	.40 (36.9)	.24 (31.8)	1.29 (81.3)	.71 (74.6)
Buildings	1.42 (33.8)	.70 (26.5)	.72 (38.0)	.22 (35.1)
Irrigation water	.04 (37.6)	.04 (45.9)	.55 (54.9)	.17 (78.1)
Equipment and vehicle leasing	1.42 (38.9)	.84 (43.1)	.38 (31.1)	.42 (45.9)
Miscellaneous	1.42 (18.7)	1.35 (20.5)	1.20 (24.3)	2.02 (32.3)
Total variable expenses	144.47 (4.1)	160.38 (3.4)	175.34 (6.0)	155.96 (5.4)
Fixed expenses:				
Taxes and insurance	20.18 (6.8)	12.20 (7.6)	9.70 (7.4)	7.46 (11.0)
General overhead	6.10 (8.5)	3.65 (6.4)	2.93 (11.7)	3.27 (12.7)
Management and other farm business expenses	2.01 (14.3)	.99 (8.3)	.86 (11.8)	1.30 (22.7)
Interest on operating capital	11.54 (19.9)	9.73 (11.8)	11.05 (15.5)	13.12 (12.9)
Interest on real estate debt	21.04 (19.0)	12.52 (18.7)	18.01 (20.4)	28.72 (14.3)
Total fixed expenses	60.87 (10.7)	39.09 (9.0)	42.55 (10.6)	53.87 (9.6)
Capital improvement outlays:				
Building construction and improvement	10.65 (37.6)	6.98 (29.9)	5.01 (29.2)	3.36 (58.9)
Land and farm improvements	1.48 (38.9)	1.29 (34.2)	1.09 (61.7)	2.77 (70.9)
Tractors and other vehicles	9.34 (28.2)	9.00 (22.9)	5.54 (36.8)	3.30 (69.4)
Autos and trucks	4.52 (26.0)	3.82 (24.0)	1.55 (29.5)	1.50 (29.5)
Farm machinery, implements, and equipment	9.27 (19.8)	19.01 (30.0)	13.30 (19.3)	12.78 (39.2)
Total capital outlays	35.26 (13.7)	40.10 (16.5)	26.49 (15.4)	23.71 (22.8)
Total expenses and outlays	240.60 (4.9)	239.57 (4.3)	244.38 (5.0)	233.54 (5.2)
	Number			
Observations	158	155	81	72

1/ Excludes landlord expenses for some items. Numbers in parentheses are coefficients of variation.



Table 5--1982 Per-acre whole farm expenses for cash grain farms in the Corn Belt, by sales size class 1/

Item	Value of sales						
	Less than	\$10,000	\$25,000	\$50,000	\$100,000	More	
	\$9,999	to	to	to	to	than	
		\$24,999	\$49,999	\$99,999	\$249,999	\$250,000	
	Dollars						
Variable expenses:							
Rent:							
Cash rent	5.22 (68.5)	3.02 (33.1)	8.42 (25.8)	10.00 (25.6)	14.10 (21.2)	16.89 (26.1)	
Value of share rent	21.42 (21.9)	39.57 (19.0)	37.79 (13.1)	54.95 (16.0)	48.66 (15.5)	48.22 (17.0)	
Seed	10.69 (8.1)	9.75 (9.8)	10.85 (7.8)	11.87 (8.6)	11.27 (8.2)	11.01 (7.3)	
Fertilizer	21.44 (15.7)	21.63 (11.6)	25.92 (7.9)	26.71 (7.4)	29.44 (5.7)	28.71 (11.6)	
Lime and soil conditioners	1.28 (53.6)	.55 (36.0)	.37 (42.4)	.78 (30.5)	.88 (37.3)	.40 (42.9)	
Pesticides	5.25 (21.6)	8.34 (17.8)	7.99 (9.8)	9.03 (10.8)	7.16 (13.2)	11.47 (14.8)	
Custom operations:							
Planting	.22 (77.9)	.74 (45.0)	.16 (49.1)	.27 (38.8)	.45 (68.1)	.02 (100.7)	
Harvesting	2.99 (23.8)	3.99 (27.3)	3.48 (21.0)	3.31 (23.1)	1.32 (36.7)	.53 (50.0)	
Livestock and poultry purchases	4.04 (51.8)	1.92 (36.0)	5.22 (47.3)	6.40 (27.0)	6.00 (28.4)	3.91 (82.0)	
Feed	4.25 (28.7)	6.68 (25.2)	4.05 (26.0)	7.21 (25.8)	5.89 (24.0)	4.88 (38.2)	
Livestock and poultry equipment and supplies	1.08 (32.1)	.86 (20.5)	.93 (21.0)	1.01 (16.6)	.75 (18.0)	.85 (47.7)	
Hired labor:							
Cash wage	1.27 (47.4)	.94 (24.7)	3.84 (31.5)	2.87 (23.0)	6.68 (27.4)	12.80 (16.9)	
Fringe benefits	.01 (61.4)	.03 (65.0)	.20 (48.3)	.44 (50.9)	1.17 (35.3)	1.60 (22.0)	
Fuel and lubrication:							
Machinery operations	19.06 (10.9)	16.53 (7.5)	16.82 (6.3)	14.45 (4.0)	12.64 (4.3)	14.10 (5.2)	
Drying and other	.60 (38.5)	.80 (36.1)	2.41 (22.4)	2.08 (18.8)	2.27 (12.1)	3.27 (15.9)	
Farm and motor supplies	10.81 (14.9)	9.75 (9.5)	13.76 (12.1)	11.27 (12.8)	10.93 (8.9)	9.83 (8.5)	
Farm marketing and storage	.67 (45.5)	.80 (31.0)	1.93 (41.7)	2.32 (28.1)	2.34 (23.7)	2.39 (24.5)	
Maintenance and repair:							
Land	.11 (58.1)	.72 (89.4)	.36 (45.2)	.53 (36.7)	.43 (44.2)	.17 (47.1)	
Farm	.36 (41.1)	.03 (62.1)	.43 (34.6)	.26 (39.1)	1.02 (81.7)	1.00 (68.0)	
Buildings	.35 (71.4)	1.22 (49.0)	.85 (31.0)	.56 (35.5)	.71 (35.6)	.40 (38.3)	
Irrigation water	.03 (61.0)	.01 (71.9)	.07 (52.9)	.07 (67.1)	.52 (49.8)	.03 (61.3)	
Equipment and vehicle leasing	.94 (57.1)	1.70 (61.0)	.95 (47.8)	.79 (58.1)	.40 (27.0)	.32 (55.6)	
Miscellaneous	1.47 (46.5)	.95 (29.6)	1.33 (21.6)	1.34 (28.9)	1.10 (23.8)	2.83 (24.3)	
Total variable expenses	113.56 (8.2)	130.53 (7.4)	148.13 (4.7)	168.52 (5.3)	166.13 (4.7)	175.63 (7.3)	
Fixed expenses:							
Taxes and insurance	17.57 (17.5)	13.58 (7.8)	14.57 (8.6)	12.50 (9.0)	9.63 (7.4)	8.18 (13.8)	
General overhead	4.86 (17.9)	4.24 (9.1)	5.09 (9.1)	3.18 (8.8)	3.07 (10.3)	3.77 (9.4)	
Management and other farm business expenses	2.40 (26.4)	1.00 (12.1)	1.37 (17.1)	.87 (12.0)	1.01 (11.7)	1.47 (27.7)	
Interest on operating capital	5.75 (31.0)	9.80 (23.4)	13.22 (17.4)	9.86 (14.9)	9.29 (16.6)	16.31 (9.0)	
Interest on real estate debt	22.74 (27.5)	15.68 (28.4)	13.33 (25.6)	12.53 (25.5)	19.04 (17.0)	32.92 (13.1)	
Total fixed expenses	53.32 (17.2)	44.30 (15.8)	47.58 (12.3)	38.94 (11.1)	42.04 (9.4)	62.65 (8.8)	
Capital improvement outlays:							
Building construction and improvement	32.06 (53.5)	1.15 (85.5)	3.40 (32.3)	8.17 (36.8)	5.44 (26.0)	4.24 (66.2)	
Land and farm improvements	1.60 (92.2)	1.01 (49.0)	1.00 (40.5)	1.27 (49.5)	1.16 (47.8)	3.79 (65.8)	
Tractors and other vehicles	11.60 (35.0)	7.44 (46.1)	7.96 (37.5)	7.83 (31.4)	6.29 (33.6)	3.90 (62.1)	
Autos and trucks	4.17 (65.4)	3.58 (59.5)	3.55 (26.4)	3.78 (31.5)	1.63 (32.2)	2.16 (22.2)	
Farm machinery, implements, and equipment	7.68 (28.2)	8.10 (39.5)	15.58 (31.2)	10.83 (26.7)	23.85 (27.7)	5.86 (25.1)	
Total capital outlays	57.11 (29.9)	21.28 (30.4)	31.49 (18.3)	31.88 (15.9)	38.37 (19.0)	19.95 (20.6)	
Total expenses and outlays	223.99 (11.5)	196.11 (9.3)	227.20 (5.9)	239.34 (5.1)	246.54 (4.6)	258.23 (5.7)	
Observations	57	72	83	96	94	64	

1/ Excludes landlord expenses for some items. Numbers in parentheses are coefficients of variation.

classes, respectively. For the largest farms, cash wages for hired labor were a large expense component, greater than fuel and lubrication expenses for machinery operations. Seed, pesticides, and farm and motor supplies were the next largest cost categories across the four size groups. Although the sample farms were classified as cash-grain operations based on total cash receipts, livestock and poultry expenses were significant and increased with livestock revenue. The largest farms had the lowest livestock-related expenses at \$5.28 per acre, and the 180-to-499-acre class had the largest at \$15.20 per acre.

The distribution of variable expenses by size of farm varied widely by type of expense. Only custom harvesting and equipment and vehicle leasing showed strictly declining per-acre expenses when farm size increased. In many categories, per-acre variable expenses rose between the first two size groups, declined for the third size group, and rose again for the largest farms.

The definition of fixed expenses is somewhat arbitrary because some of the management and other farm business expenses may vary with the level of current operations. Interest on operating capital includes interest on loans to pay current variable expenses as well as on loans for capital equipment and prior-year expenses. The largest components of fixed expenses are interest, taxes, and insurance. Per-acre expenses for taxes and insurance declined from \$20 for the smallest farms to \$7 for farms with 1,000 acres or more. Larger farms evidently were able to spread these expenses over more acres to yield lower per-acre expenses. For the four acreage classes, ordered smallest to largest, interest charges were 54, 57, 68, and 78 percent, respectively, of fixed expenses. Larger farms paid more of their fixed expenses in interest charges, and also paid more per harvested acre than smaller farms for interest on operating capital and real estate debt. However, the smallest acreage farms paid more per acre (\$61) for all fixed expense items than the largest farms (\$54).

Capital improvement outlays include the farm share of current-year investments in structures, motor vehicles, machinery, land improvements (such as clearing or leveling), and farm improvements, such as corrals and wells. Repair and maintenance of capital items are included in variable expenses. Although per-acre capital outlays declined when farm size increased, the coefficients of variation were high. Farms with fewer than 180 acres had low per-acre farm machinery and implements and equipment purchases, but apparently greater purchases of other capital items. For the three largest size categories, farm machinery was the largest per-acre expense, making up 47 to 53 percent of capital outlays. For all size groups, per-acre capital outlays in land and farm improvements and farm machinery declined when farm size increased.



Per-acre expenses by farm sales class increased when sales increased because of rising variable expenses, differing from the acreage classification results (table 5). Several other expense patterns also differed from the acreage size results. The overall pattern of fixed expenses was erratic. Total per-acre capital outlays were highest for farm operations with less than \$10,000 of sales, dropped sharply in the next sales class, then rose through the next four sales groups before dropping sharply again for the largest sales class.

## CONCLUSIONS

FPES may be used to measure accurately size distributions of aggregate per-acre expense categories and detailed expense items only with a larger survey. The distribution of per-acre whole farm expenses does not appear to decline smoothly with farm size. When using acreage classes, variable per-acre expenses decline only for the largest farm size. When using sales classes, variable per-acre expenses increase with farm size. The distribution of fixed expenses by acreage class declines with farm size, but the distribution of fixed expenses by sales class is irregular. This pattern also applies to per-acre capital outlays, but the high coefficients of variation make this pattern tentative.

Total per-farm acre variable expenses generally rose with size of farm until the very largest farms were examined. Per-acre expenses for fertilizer, seed, fuel, and lubrication for machinery operations and farm and motor supplies did not decline smoothly as harvested acreage increased. For the last three expenses, per-acre expenses declined with farm size but rose for the largest size classification, although relative enterprise mix was not constant for the different sizes.

Three factors can differentially influence the expense relationship between the two farm size definitions, sales class and acreage level. First, because more sales classes exist than acreage classes, there are fewer observations on average per group, possibly causing higher variability across sales classes. Second, the observations are grouped differently by the two size definitions (see table 1). Thus, similar class definitions, for instance, the largest farms, contain different observations. If a high correlation exists between acreage size and sales, the same expense distributions should be apparent using either approach. However, because all farm operations in the sample did not have the same enterprise mix, a one-to-one relationship among size definitions is not certain. Although some individual expense components and groups seem to have the same distributions, other items do not. Finally, preliminary evidence indicates that underreporting of income in the FPES has occurred, particularly in the largest sales categories. Thus, it is possible that the farm observations used in this study may not have been classified in the correct sales groups.

The research demonstrates that the FPES can be used to measure expenses on a whole-farm basis by region, type, and size.



But results revealed several potential problems when using FPES data. A potentially serious technical problem includes the lack of landlord data which may significantly bias some of the figures reported in these tables. When this problem is remedied, the "type" of farm composition problem inherent in measuring whole-farm costs by using SIC classification criteria will continue to complicate measurement and limit conclusions about farm size and efficiency. However, quantitative and descriptive analysis by general type and size of farm does appear to be feasible. Such analysis would become critical to the extent that accurate micro-economic or disaggregated economic indicators and statistics of the farm sector are developed in the future.

# The Value of Net Change in Farm Inventories, 1974-83

Roger P. Strickland\*

Economists use two major measures of net farm income: realized net farm income and total net farm income. The latter is used most frequently, particularly in the media and publications written for the general public, and is generally referred to simply as net farm income. Total net farm income is more conceptually consistent with the Department of Commerce's national income and product accounts, and is essentially a measure of value added to the products at the farm level and includes noncash components. Realized net farm income differs in that the value of the change in inventory, a key noncash component of the total net farm income, is excluded until the physical stock is either fed to livestock or sold. This article reviews the concept of valuing the net change in inventories and the effects on net farm income.

Total net farm income is derived by the addition of the value of the beginning-to-end-of-year net physical change in farmer-owned inventories of agricultural commodities (which may be positive or negative) to realized net farm income. Total net farm income is the net value of farm commodities produced during a specific year, whether or not the product was sold or consumed in that year. The inclusion of inventory change in total net farm income allows income to reflect correctly the timing of production. Inclusion of net inventory change to obtain total net farm income allows comparability with the net income of nonfarm businesses as reported by the Department of Commerce. Comparability in income estimates is essential in order to aggregate to national income totals.

The value of the net change in inventory is computed on a commodity and State basis and then aggregated. The physical changes are valued by commodity, using average calendar-year market prices received by farmers. These prices frequently are similar to season average prices published by the Statistical Reporting Service. The two may differ for any commodity if the marketing pattern changes substantially between the two crop years overlapping the calendar year and for those commodities placed under Commodity Credit Corporation

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\*The author is leader, Farm Income and Balance Sheet Section, Economic Indicators and Statistics Branch, National Economics Division, ERS.

(CCC) loans, if the loan price is significantly different from the market price.<sup>1/</sup>

Changes in realized net farm income are less volatile than changes in total net farm income, because crop marketings are less volatile than all crop production. The net value of the inventory change is frequently a substantial percentage of total net farm income, and the annual value of the inventory change may even appear to understate the impact on the year-to-year change in income because of the tendency for the value of the change in inventories to increase and decrease alternately. Fluctuations in the quantities of the major field crops in inventory typically account for most of the change in inventory valuation (table 1). The inventories of livestock tend to move in cyclical patterns with small year-to-year changes. For these reasons, this discussion is limited to the crops components of inventory.

Increases in the net value of inventory change translate directly into a corresponding increase in total net farm income. Decreases cause realized net farm income to rise but corresponding, and largely offsetting, increases in the cash receipts component of gross farm income. The sales from inventory are in addition to sales from the current year's production.

The value of net changes in inventory over the last decade can be largely explained by movements in the market prices received by farmers. Choosing to sell now versus storing for sale at a later date is a marketing activity separate from the production activity. Except for producers with cash flow problems, marketing decisions are based primarily on current market prices and expectations as to future market prices. U.S. production, which reflects the effects of weather and Government farm programs, is of course a major determinant of prices received by farmers; but existing stock levels, the demand for exports, and the state of the U.S. economy are also key determinants. The year-to-year changes occurring in the end-of-year prices for corn, soybeans, and wheat exhibit a definite inverse relationship, but corresponding in relative magnitude, with the change in inventory value (table 2). This relationship is particularly evident in years of large changes.

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<sup>1/</sup> The placement of commodities under CCC loan has historically been treated as a sale because the final disposition is at the discretion of the farmer. Farm income measures include the difference between new loans made and old loans repaid. For further explanation, see (1). Under-scored numbers in parentheses cite references listed at the end of this article.



Table 1--Annual value and change of farmer-owned commodities, 1973-83

Year	Income before inventory adjustment <u>1/</u>		Income after inventory adjustment <u>2/</u>	
	Value	Change	Value	Change
	Million dollars	Percent	Million dollars	Percent
1974	28,920	-6.8	27,309	-20.7
1975	22,155	-23.4	25,555	-6.4
1976	21,680	-2.1	20,132	-21.2
1977	18,741	-13.6	19,821	-1.5
1978	26,835	43.2	27,651	39.5
1979	27,306	1.8	32,251	16.6
1980	26,842	-1.7	21,505	-33.3
1981	22,423	-16.5	30,058	39.8
1982	23,903	6.6	22,051	-26.6
1983	<u>3/</u> 31,000	29.7	<u>3/</u> 21,000	-4.7

1/ Data equivalent to operators' net farm income (after inventory adjustment) less net change in farm inventories (2, pp. 65 and 77). 2/ Equivalent to operators' net farm income (2, p. 77). 3/ Data are preliminary and midpoints of published ranges (3).

Table 2--Annual value of inventory change for agricultural commodities owned by U.S. farmers and December-to-December change in prices for corn, soybeans, and wheat, 1973-83

Year	Value of inventory change <u>1/</u>		Change in price <u>2/</u>		
	Crops	Total	Corn	Soybeans	Wheat
	----- Million dollars -----		----- Dollars/bu. -----		
1974	-2,065	-1,611	0.88	1.38	-0.13
1975	4,444	3,399	-.90	-2.75	-1.24
1976	-860	-1,548	-.13	2.28	-1.02
1977	2,325	1,080	-.27	-.88	.08
1978	2,091	816	.12	.81	.54
1979	4,085	4,945	.29	-.22	.80
1980	-6,675	-5,336	.81	1.53	.41
1981	7,349	7,635	-.80	-1.80	-.42
1982	-1,102	-1,852	-.13	-.54	-.29
1983 <u>3/</u>	<u>3/</u> -10,000	<u>3/</u> -10,000	.89	2.28	-.04

1/ Total of crops and livestock and livestock products is published in (2, p. 65), but the crops component is unpublished. 2/ Computed as U.S. monthly price for December of current year less corresponding price from preceding year (4, 5, and 6). 3/ Inventory data are preliminary and midpoints of published ranges (3).

Given the relationships evident in table 2 between inventory changes and prices of the three commodities, farmers, being both opportunists and optimists, appear to empty their storage bins when commodity prices rise dramatically and restock their bins when prices fall sharply. These relationships are particularly obvious in the big inventory drawdowns of 1974, 1980, and 1983 and the large replenishments of stocks that occurred in 1975, 1977, and 1981 when all prices were moving down together. Drought conditions and other unpredictable factors, such as the corn blight epidemic of 1970, the massive Soviet grain purchases of 1973, and the 1983 payment-in-kind Government program, indirectly contribute to changes in inventory levels, but farmers respond more to the expected and resulting movements in prices, rather than to changes in physical flows.

The substantial buildup of inventories in 1979 apparently responded to conditions other than large, across-the-board drops in market prices. Farmers began 1979 holding large inventories and harvested another large crop that year. With prices already low at the beginning of the year and the large supplies keeping prices down, farmers increased their inventories by the end of the year, probably hoping for more favorable prices in the following year. The drought in 1980 drew down the large inventories.

The inventory reduction in 1982 occurred during falling prices because of a change in the producers' perception of the attractiveness of CCC loan rates relative to market prices. In considering large carryover stocks from 1981 and the second consecutive bumper crop in 1982 which further depressed already low market prices, farmers placed their commodities with the CCC, thereby supplementing their cash flow and transferring the risks of further reductions in market prices to CCC. Despite the terminology, CCC loans are essentially a sale to the Government with the producer having the option to repurchase, if market prices exceed the "loan rate" at a future date, such that a resale in the open market would yield a premium. For this reason, CCC loans are treated as sales both in the farm income accounts and by many farmers in their reporting of income to the Internal Revenue Service.

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# Leasing of Agricultural Inputs

Sandra Suddendorf \*

The growth in leasing equipment, land, or milk cows shows that the farm sector is beginning to lease income-producing assets instead of purchasing them. Rising farm machinery prices and interest rates have kept many farmers from purchasing their own equipment, particularly in years of low farm income. This article uses survey data to analyze trends in leasing of equipment, land, and dairy cows by geographic regions and economic sales classes.

The use of financial and/or operating leases can be very attractive to a beginning or expanding farmer. An operating lease, which can be useful when certain equipment is needed for only part of a year, covers a short period of time, allowing flexibility to adjust to current market and financial conditions. A financial lease has a life of 3 to 4 years with options to buy the leased equipment after the lease expires. Although the lessee loses the depreciation and interest tax writeoffs associated with the ownership, the option to buy equipment at the end of the lease at a fixed loan rate offers some security in a period of economic uncertainty and variable interest rates. Through leasing, downpayments are eliminated, working capital is freed for other uses, long-term debt is avoided, and lease payments are income-tax deductible expenses.

Data gathered by the 1982 Farm Production Expenditure Survey (FPES), a combined effort of USDA's Economic Research Service and Statistical Reporting Service, show a 5-percent increase in total acres rented since 1976 with a 16-percent increase in cash-rented acres and an 11-percent decrease in share-rented acres. In 1976 the cash-rented acres constituted 57 percent of total acres rented. By 1982 cash-rented acres made up 63 percent of total rented acres. Cash-rental payments only accounted for 30 percent of total rental payments in 1976 but 36 percent in 1982. The number of acres rented each year has increased slightly, although the total land in farms has decreased. As the number of farms decreases, farmland becomes available for purchasing or leasing as rental property to other farmers.

A fixed amount pays for the use of the land in a cash-rental arrangement. Established and expanding farmers often choose the cash-rental arrangement because they already have most of

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\*Suddendorf is an agricultural economist, Economic Indicators and Statistics Branch, National Economics Division, ERS.

the inputs, such as fertilizer and seed, needed to farm more land. In a share-rental agreement, the expenses and income associated with the production on that land are shared by the landlord and the tenant. Such factors as the weather, changes in import-export quotas, prices, Government commodity programs, and land values can influence the terms of a share-rental agreement. By share renting, the gains or losses are spread among the participants of the agreement, thereby lessening the risk on any one person. This risk sharing is one reason why a new farmer may find share renting an attractive option.

Although cash and share renting have been used for many years, equipment leasing is relatively new, and many farmers have not used this option. Leasing expenses for tractors, self-propelled machinery, other farm machinery and equipment, and motor vehicles totaled \$500 million in 1982, almost a 14-percent increase over 1981 and a 37-percent increase over 1980 (table 1). Data from the 1980 and 1981 FPES indicate that tractors and other farm machinery made up about 75 percent of equipment rentals.

The 1980 and 1981 FPES data covered 14 States individually, and seven regions. These seven regions contained the other 34 States, excluding Alaska and Hawaii. In 1982, the 48

Table 1--Leasing expenses and gross rental payments, 1980-82

Item	:	1980	:	1981	:	1982
	:					
	:			<u>Million dollars</u>		
	:					
Leasing or rental of:	:					
Tractors	:	99		132		NA
Self-propelled machinery	:	37		43		NA
Other farm machinery	:	144		171		NA
Motor vehicles	:	51		54		NA
Total	:	331		400		454
	:					
Gross share rent <u>1/</u>	:	8,099		6,588		7,221
	:					
Gross cash rent <u>1/</u>	:	3,745		4,402		4,024
	:					
Milk-cow leasing	:	NA		NA		18
	:					

NA = not available.

1/ Gross rent payments are total rental payments made before any landlord expenses are excluded.

Source: U.S. Dept. of Agriculture, Statistical Reporting Service, Farm Production Expenditures for 1980 and 1981, SpSy 5, July 1983, and Farm Production Expenditures for 1982, SpSy 5, July 1983.

States were grouped into 10 regions. The four regions of the Northern Plains, Southern Plains, Mountain, and Pacific, were combined to get one grouping of 17 States which was comparable from 1980 through 1982 (table 2). This group averaged 50 percent of machinery leasing for 1980-82, with a high of 58 percent in 1980. The five States in the Corn Belt region accounted for an average of 19 percent of equipment leasing for 1980-82, with a high of 21 percent in 1981. Using the 1982 FPES data only, the Northern Plains farmers spent \$86 million for equipment leasing as did the Corn Belt farmers. This amount represented 19 percent of total equipment leasing (table 2). Machinery leasing in the Pacific, Mountain, and Southern Plains regions accounted for 13, 12, and 15 percent, respectively, of total equipment leasing. The Lake States region showed some growth using equipment leasing, moving from 10 percent of leasing expenses in 1980 to 13 percent in 1981 and 1982. The four Southeast region States also increased their share of leasing expenses by 2 percent each year, from 4 percent in 1980 to 8 percent in 1982. Although the major crop-producing regions accounted for the most spending on leased equipment, other regions were leasing more frequently as well.

The Corn Belt region is a major user of rented land, as well as equipment rentals, under both cash- and share-rental arrangements. Whether a cash- or a share-rental agreement is made between a landlord and tenant may depend on several factors, such as geographic location of the land and type of commodity grown on this land. A commodity that can be easily divided into specific units of measure like bushels, such as the grains in the Corn Belt, is more likely to be produced under a share-rental plan, with the landlord contributing the land and some portion of the operating expenses. If a crop is grown in an area that is subject to losses from drought, hail, or other weather elements, a share agreement is usually proposed. If the selling price of a commodity is rising, landlords may prefer a cash-rental arrangement because they could realize a greater proportion of the higher returns. When prices drop and become more uncertain, the landlord may shift back to share renting, sharing more of the risk and improving the chances for the tenant to earn a profit and remain in business.

Although the Corn Belt makes up almost half of the gross share-rent payments, this region makes less than a third of the gross cash-rental outlays. The Corn Belt region has accounted for an average of 27 percent of cash-rent payments and an average of 49 percent of share-rent payments during 1980-82. For 1982 alone, Corn Belt cash-rent payments were 25 percent of total U.S. cash-rent payments, and Corn Belt share-rent payments constituted 43 percent of total U.S. share-rent payments.

The Northern Plains, Southern Plains, Mountain, and Pacific regions combined paid out an average of 34 percent of cash-rent payments, and averaged 32 percent of share-rent payments



Table 2--Percentage distribution of equipment and milk-cow leasing expenses and gross-share and cash-share rental payments, by production regions, 1980-82

Item	North- east	Lake states	Corn Belt	Appa- lachian	South- east	South- ern Plains	North- ern Plains	South- ern Plains	Mountain	Pacific	West- ern States	United States
Equipment leasing:												
1980	3	10	16	3	4	1/	6	1/	1/	1/	58	100
1981	5	13	21	4	6	1/	7	1/	1/	1/	44	100
1982	3	13	19	2	8	19	6	5	12	13	49	100
Gross share rent:												
1980	1	6	51	5	1	1/	6	1/	1/	1/	30	100
1981	2/	6	52	6	1	1/	5	1/	1/	1/	30	100
1982	2	5	43	7	1	16	5	10	5	6	37	100
Gross cash rent:												
1980	3	17	29	7	6	1/	4	1/	1/	1/	34	100
1981	4	23	26	6	7	1/	5	1/	1/	1/	29	100
1982	4	16	25	6	6	13	4	7	7	12	39	100
Milk-cow leasing:3/												
1982	1	6	43	5	14	7	0	0	21	3	31	100

1/ Includes the Northern plains, Southern plains, Mountain, and Pacific States. The States that represented each of these 4 regions in 1982 were not the same States that represented each region in 1980-81. The combined Western States group is composed of the 17 States represented by these 4 regions and is comparable for the 3 years.

2/ Less than 0.5 percent.

3/ Milk-cow leasing expenditures were not collected for 1980-81.

for 1980-82. Although the Corn Belt region experienced a slight decline in 1982 for both cash- and share-rental payments, the combined area increased its share to 39 percent of total cash-rent payments and 37 percent of total share-rent payments. In 1982 the Northern Plains States made 13 percent of cash-rental payments, followed by the Pacific region with 12 percent. The Northern Plains also made 16 percent of the share-rental payments, and the Southern Plains contributed another 10 percent. The Lake States region accounted for an average 19 percent of total cash-rent payments for 1980-82. Sixteen percent of total cash-rent payments came from this region in 1982, but only 5 percent of total share-rent payments.

The 1982 FPES supplied data for the first time on milk-cow leasing. Although the 1 year of data is insufficient for indicating the presence of trends, the data do suggest several interesting relationships. The Corn Belt region accounted for 43 percent of the \$18 million spent in 1982 on milk-cow leasing. Perhaps because of the growth of large-scale drylot dairies, the Mountain region had 21 percent and the Southeast region had 14 percent of 1982 milk-cow leasing expenses. The major milk-producing States of Wisconsin, New York, and Pennsylvania do not fall into these three regions. Established dairy operations are more likely to increase their herd size through breeding and perhaps through purchasing new stock.

New or expanding dairy operators are apparently leasing as an alternative to purchasing or breeding stock because of limited funds or uncertainty in the dairy market. For some crop farm operators who supplement their income by maintaining small dairy herds, leasing can offer some flexibility in herd size.

The FPES also provides a breakdown of equipment leasing expenses by economic sales class (table 3). The leasing expenditures in the \$200,000 and over class grew from \$159 million in 1980 to \$259 million in 1982, representing 57 percent of total equipment leasing. This growth also yielded a 63-percent increase from 1980 to 1982. The next sales class, representing sales from \$100,000 to \$199,999, has also increased its share of leasing expenses, from 17 percent in 1980 to 22 percent in 1982. While the equipment leasing costs in the \$40,000 to \$99,999 class accounted for 18 percent of the total in 1980 and 20 percent in 1981, this class dropped to 12 percent in 1982. The remaining sales classes also showed declining leasing expenses, except for the \$20,000 to \$39,999 class, which showed a slight increase.

The distribution of cash-rent and share-rent payments by economic sales class followed a pattern similar to that of the equipment leasing. The largest class with sales of \$200,000 and over paid larger shares of both cash- and share-rent each year since 1980. About 48 percent of total cash-rent payments were made by this class in 1982, an increase of 22 percent from 17 percent over 1980 and accounting for 40

Table 3—Percentage distribution of equipment and milk-cow leasing expenses and gross-share and cash-rental payments, United States, by value of sales class, 1980-82

Item	: \$200,000 : and : over	: \$100,000 : to : \$199,999	: \$40,000 : to : \$99,999	: \$20,000 : to : \$39,999	: \$10,000 : to : \$19,999	\$2,500 : to : \$4,999	: Less : than : \$2,500	: All : farms
Equipment leasing:								
1980	48	17	18	4	5	5	3	100
1981	54	17	20	3	2	2	2	100
1982	57	22	12	5	2	1	1	100
Gross share rent:								
1980	31	26	31	7	2	2	1	100
1981	36	25	25	8	3	2	1	100
1982	40	23	26	7	3	1	1/	100
Gross cash rent:								
1980	42	23	20	5	6	2	2	100
1981	39	26	22	6	3	2	2	100
1982	48	22	19	6	2	2	1	100
Milk-cow leasing:2/								
1982	43	43	13	1	0	0	0	100

1/ Less than 0.5 percent.

2/ Milk-cow leasing expenditures were not collected for 1980-81.



percent of total-share rent payments in 1982. The next sales class, \$100,000 to \$199,999, contributed another 22 percent of total cash-rent payments in 1982, followed by the \$40,000 to \$99,999 class, at 19 percent. The \$100,000 to \$199,999 class had slightly higher cash-rent payments than the \$40,000 to \$99,999 class, but lower share-rent payments for 1980-82. In 1982 26 percent of total share-rent payments came from the \$40,000 to \$99,999 class, and 23 percent from the \$100,000 to \$199,999 class, a trend since 1980. The remaining classes accounted for less than 11 percent of both cash rent and share rent in 1982.

The growth in leasing either equipment, land, or milk cows in terms of current and real dollars (1967=100) shows that the farm sector is beginning to lease income-producing assets instead of purchasing them. Rising machinery costs and high interest rates over the past 3 to 4 years have helped curb purchases of capital items such as machinery, equipment, and motor vehicles, giving the leasing industry a chance to sell its idea to those farmers who had delayed purchases. Farms with sales of \$40,000 and over, and especially those with sales of \$200,000 and over, have increasingly incorporated leasing of equipment and renting of land into their plan of operation relative to those farms with sales of less than \$40,000.

The major crop- and livestock-producing States are in the Corn Belt, Northern Plains, Pacific, and Lake States regions, where most leasing of equipment and rentals of land are concentrated. The geographic area shifts slightly where milk-cow leasing is concerned. The Corn Belt region predominates, but the Mountain and Southeast regions also represent major shares. The recently signed dairy legislation that will pay dairy farmers who reduce their milk output by 5 to 30 percent may affect the dairy-leasing industry. This new program stipulates that operators who participate cannot lease or sell surplus cows to others for milking.

Leasing expenditures are accounted for in USDA's farm income accounts as a part of machine hire and customwork expenses. Land rental expenditures are also a part of production expenses, namely net rent to landlords. Both leasing of equipment and land rental costs are becoming more significant, because more farm operators are becoming aware of and using these options to acquire operational control of resources.

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